JULY, 1945

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TOOL & DIE JOURNAL

TOOLING AND PRODUCTION

Preferred FROM MACHINE TO FRONT OFFICE

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"BECAUSE of the importance of our milling machine department in our set-up, we see to it that they have the best equipment and tools available. That's why you'll find Putnam End Mills being used."

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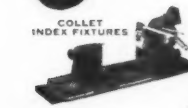

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CONTENTS

Feature Articles Index 95

Editorial 97

Feature Articles 98

Progress-on-Parade 121

Industrial Digest 125

Publication Previews 130

Shop Aids 163

Buy-With-Confidence 196

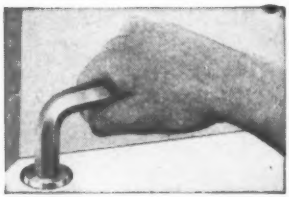
Advertisers' Index 224

SOCKET SCREWS

by

HOLO-KROME

The Better Fastening Method



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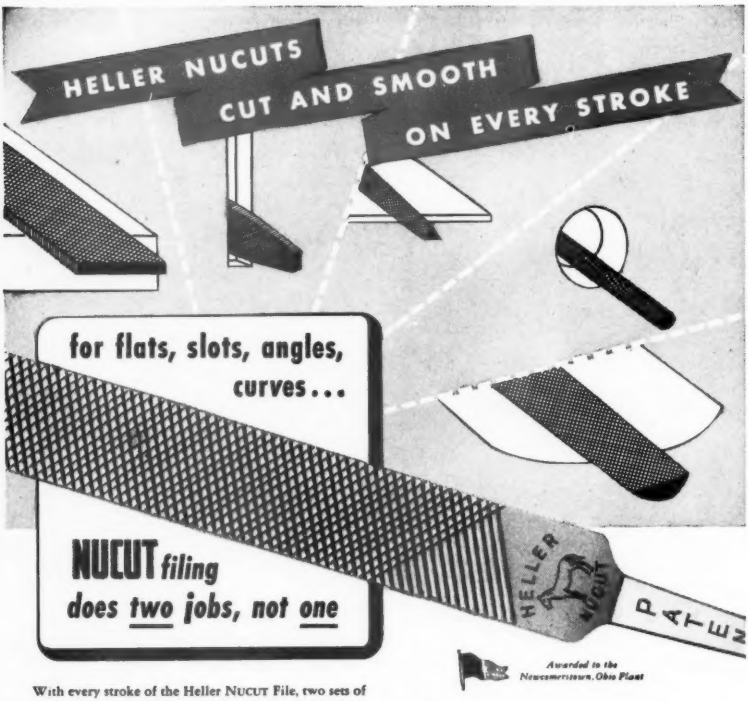

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It is a patented Heller NUCUT feature that makes possible this cut-and-smooth, two-file filing. Scientific construction, with alternately increasing and decreasing space intervals between tooth rows—which identify the "Wavy Teeth" design—prevents chatter. The result is faster, easier filing without clogging, skidding or scraping

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America's Oldest File Manufacturers—Good Tools Since 1836

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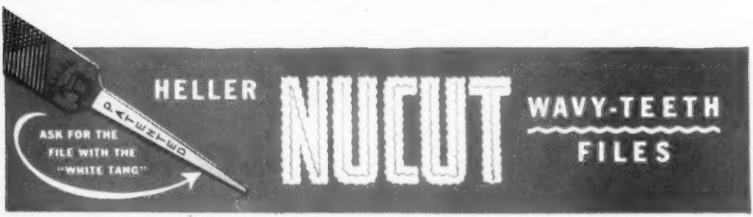

SAVE THESE FOR WORK A MACHINE CAN'T DO

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Write for Catalog 45, showing many ways to speed production with flexible shaft equipment. And remember—save your hands for work a machine *can't* do.

R. G. HASKINS CO.
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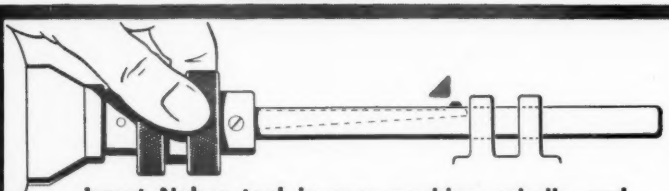
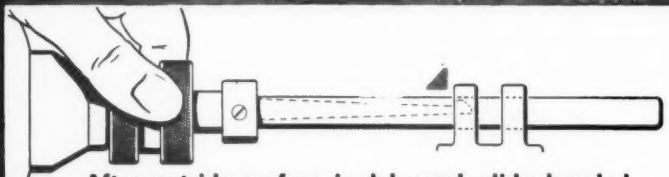
How to deburr holes faster!

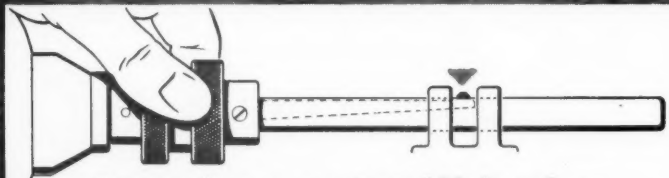


1. Insert Nobur tool in any machine spindle and deburr outside surface of work.

Works like a drill—operator works with complete safety—parts can be burred as fast as they can be handled by operator.



2. After outside surface is deburred, slide knurled sleeve back to retract blade.



3. Move work on over retracted blade and deburr inside surface.

Double-edged cutting blade thus instantly removes burrs around holes in flat or curved surfaces of single or multi-walled parts—smoothly and accurately.

Send for new deburring folder. Write

NOBUR MANUFACTURING COMPANY

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All Nobur tools are now furnished with pilot shafts hard chrome plated!

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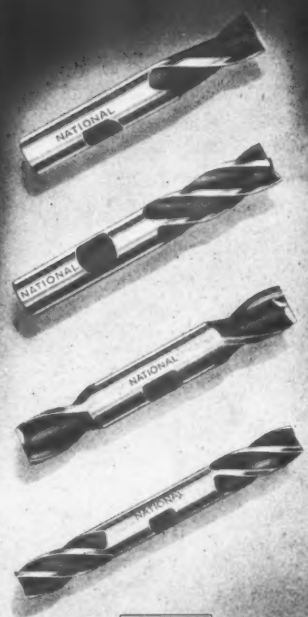
Ask your National distributor for complete information on "Helex" End Mills or write direct for free 16-page "Helex" booklet.



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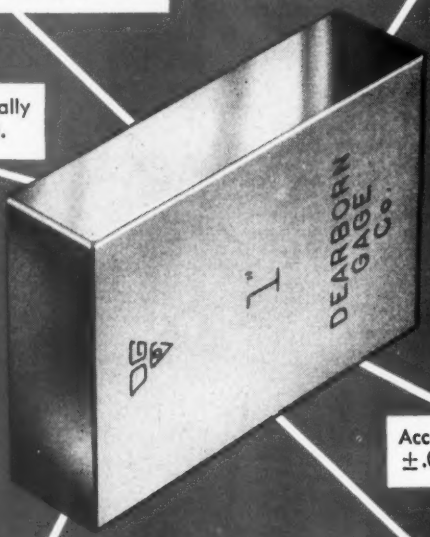

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At one setting a CINCINNATI Plain Hydraulic grinds an unusually smooth and accurate finish on the diameter and flange of an aircraft cylinder barrel.

On this particular job there were three requirements: (1) exceptionally high-grade finish on diameter and adjacent flange; (2) fast production; (3) accuracy. This CINCINNATI 10" Plain Hydraulic Grinding Machine, tailored to the job, filled the bill completely. Here are the changes that were made in the machine: Wheelhead set at a 30° angle, with headstock and tailstock interchanged so that the heavier unit could absorb the thrust. In addition, the machine is equipped with a standard automatic infeed attachment which leaves the operator free to attend to other duties while the grinding operation progresses.

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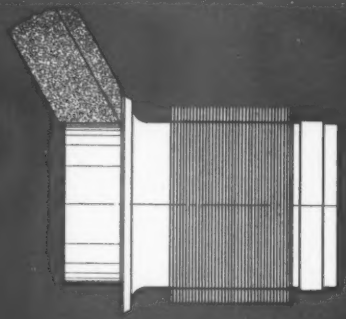

Above: With wheel at an angle the same high-grade finish is produced on both diameter and flange at one setting.

Below: CINCINNATI 10" Plain Hydraulic Grinding Machine with angular wheelhead. Notice that the headstock and footstock have been interchanged to direct the thrust against the headstock unit.

CINCINNATI GRINDERS INCORPORATED

MACHINES . . . CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

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Catalogue No. 45-J describing the sensational "Cone-Lok" principle is now available. *Write for your copy.*

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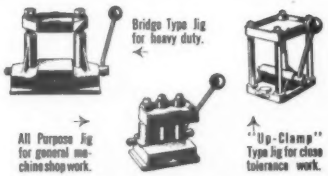

The Jack-Lok, a special fixture clamp using the "Cone-Lok" principle for use in special fixture designs is available.

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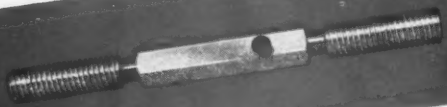

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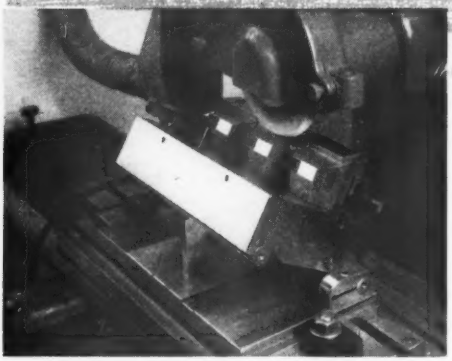

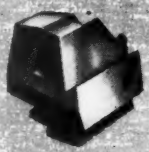

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The MAGNA-SINE

WILL HELP YOU MAKE THEM MANY TIMES FASTER

You can save time and money in many ways with The MAGNA-SINE on short runs involving just a few parts. First, any angular set-up for grinding or other light machining operations can be made on The MAGNA-SINE in a very small fraction of the time required for conventional set-up methods. This time saving alone is enough to make The MAGNA-SINE an extremely valuable shop tool.

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Every grinder and jig borer in your tool room that does an average amount of angular work should be equipped with a MAGNA-SINE. Write for complete information on The MAGNA-SINE and what it can do for you today.

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with the
ROBBINS
(NON-MAGNETIC)
SINE PLATE

For inspection and in many other uses the Robbins Non-Magnetic Sine Plate provides a fast, accurate method of making angular set ups. Write today for complete information.

Robbins ENGINEERING COMPANY

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THESE 7 USERS "TELL ALL" ABOUT GEMCO SHAPERS

(From Letters in Our Files)

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"We have two GEMCO Shapers in our Tool Room, and whenever I have a particularly difficult job to do, I always see that it is done on the GEMCO."

A Mfr. of Electric Motors Says:
"Our GEMCO Shaper is very satisfactory, and has proven its worth to us many times over."

A Mfr. of Electric Elevators Says:
"Your shaper has a wide range of feeds and speeds, and the down feed on the tool post, especially, has been a big help to us. Our machinists like the GEMCO Shaper better than the majority they have seen or used."

A Large Mfr. of Hand-Forged Tools Says:
"We are using a GEMCO to shape tough alloy steels to quite critical dimensions. We find the settings on the feeds accurate and easy to operate. Also, there is a definite saving in production time by the use of the motorized quick return on the table. And the "Lubrigard" safety is noteworthy as a feature to prolong the useful life of the shaper."

A Leading Mfr. of Files and Rasps Says:
"GEMCO features such as downfeed of head, finger tip touch of traverse, and your lubricating system, are perfect. Our next shaper will again be a GEMCO."

A Pump and Machinery Corporation Says:
"The men in our tool room are most enthusiastic in their praise of the GEMCO Shaper's performance and accuracy, which was not even approached by the older machine it replaced."

A Circuit Breaker Mfg. Co. Says:
"We have had this shaper about a year, and our tool makers are still talking enthusiastically about it."

GEMCO

Multi-Purpose SHAPERS

The Universal Type of GEMCO Shaper, shown above, is ideal for tool and die work, or where angular work set-ups are required. Check the following time-tested features: Exclusive "Lubrigard" Safety Device increases the precision life—Centralized Controls save time and effort, increase production—Large, easy-to-read dials—Wide range of feeds and speeds.

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GENERAL ENGINEERING & MFG. CO.

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Manufacturers of PRECISION MACHINERY

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I BEST TO ABY 'EM!
SET 'EM CORRECTLY
NICE SETTIN'! THANK YOU SIR!
Carbide tools should have just enough ri provide free cutting action, AND NO M Otherwise you weaken the cutting edge, cutting point exactly at the height of centerline of work.
FIRTH-STERLING STEEL COMPANY
WHEN GRINDING DONT USE TOO MUCH FORCE
HELP!
VRE TO USE ROPER OL!
FOR SHAPE
Carbide tools operate at higher speeds than any other metal-cutting tools. Carbide tools should always be larger than the steel or alloy tools they replace. Also, make sure they are of the correct style, shape, and grade.
FIRTH-STERLING STEEL COMPANY
GRIND 'EM PROPERLY!
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Grinding rules for carbide tools are easily avail- able and should be followed carefully. The right wheel, running in the right direction, preserving correct angles are some of the
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to move the saw to the work

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SPEEDS: . . . . Selective 60, 90, 130 feet per minute.
WEIGHT: . Approximately 750 pounds

WHY waste time and manpower moving stock to a fixed saw — it's easier to roll a portable Wells right where you want the cutting done. The Wells cuts quickly, most any shape or size metal you can get into it . . . with a minimum of labor. Easy to use, economical, this handy Wells No. 8 frees larger units for production work, pays for itself in time and labor savings.

WRITE FOR DETAILS

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
1940 ASH STREET, THREE RIVERS, MICH.

THE "PORCUPINE" HAS QUILLS OF GRAPH-MO STEEL

In order to speed production of the Flying Fortress, inventive Tooling Engineers of Boeing Aircraft Company designed and built the "porcupine", a tool that punches out 388 exactly placed rivet holes with a single stroke of a mammoth press. In five fast operations this ingenious tool punches the 976 holes needed to rivet together all the parts of a Fortress bomb-bay catwalk—*thirty times quicker* than the former method of electric drilling.

Because the "porcupine" was a complex and expensive tool to build, Boeing engineers were very discriminating in their choice of tool steel. That's why they made all the punches and inserts of Graph-Mo Steel.

Graph-Mo an oil hardening steel is one of the five performance-proven Timken Graphitic Steels. They machine 25% to 30% faster than competing steels, have excellent non-seizing qualities, offer stubborn resistance to wear and abrasion and show remarkably good response to heat treatment.

Boeing used every one of these qualities to advantage in producing the "porcupine". You will find them useful to increase the quality and to speed the production of your products. Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

A request written on your firm's letterhead will bring a 48 page booklet that is full of useful information about the five Timken Graphitic Steels.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
GRAPHITIC STEELS

3,286,212 TURNER PLUG GAUGES

. . . are hitting the target!

We don't know how many plug gauges laid end to end it would require to reach Tokyo, but we do know that we made 3,286,212 steel and chrome plug gauges to check many types of war implements that do reach our military objectives.

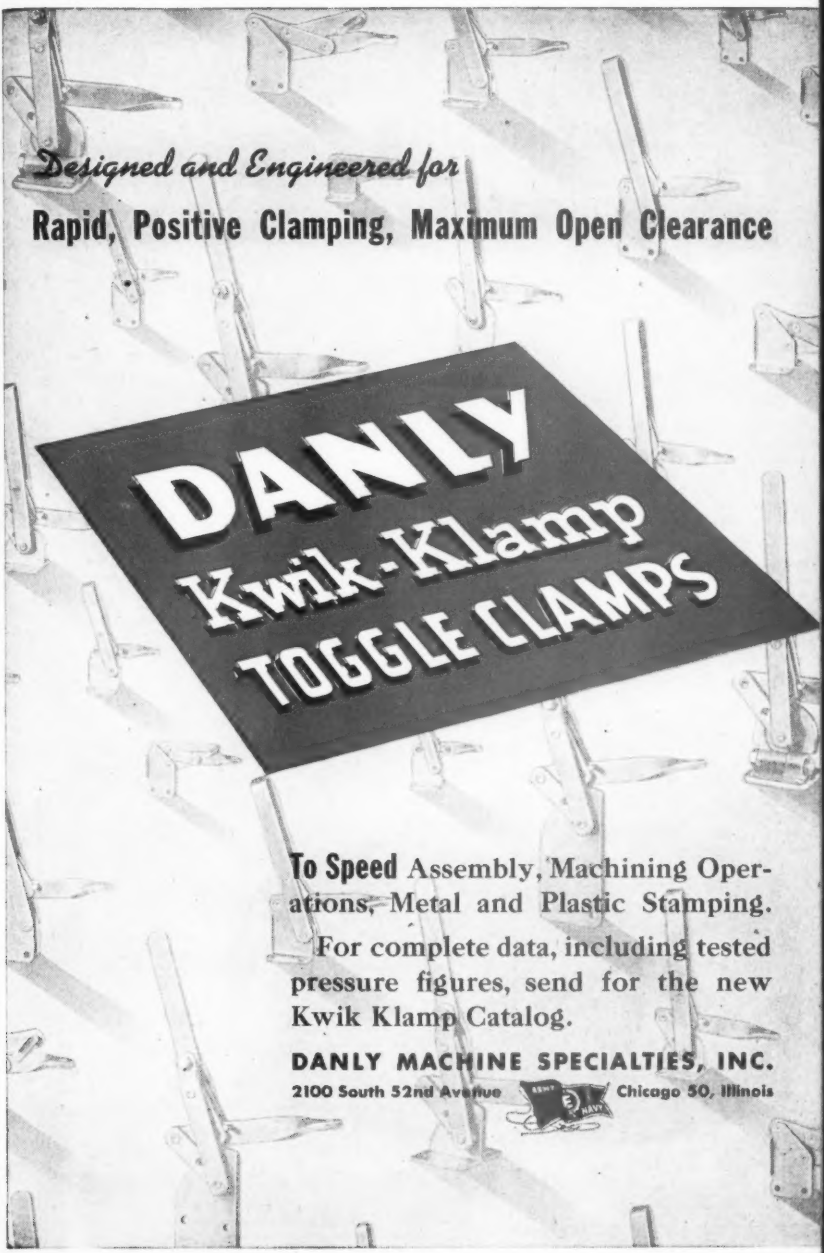
Yes, *precision* has become the watchword of industry during this war, and it will continue to be a factor in those industries that will be the leaders in peacetime production.

★ Remember the name Turner when you think of Precision.

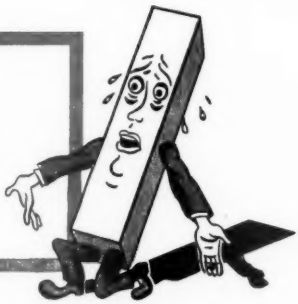
TURNER BROTHERS

TURNER GAUGE GRINDING COMPANY

2625 HILTON ROAD • • • • FERNDALE, MICH.


Designed and Engineered for
Rapid, Positive Clamping, Maximum Open Clearance
DANLY
Kwik-Klamp
TOGGLE CLAMPS
To Speed Assembly, Machining Operations, Metal and Plastic Stamping.
For complete data, including tested pressure figures, send for the new Kwik Klamp Catalog.
DANLY MACHINE SPECIALTIES, INC.
2100 South 52nd Avenue
Chicago 50, Illinois

Stop Abusing Your Tool Bits



Users say:
The first real tool holder improvement in 25 years!

Exclusive vise-grip jaw eliminates rocking, because it exerts equalized pressure over *full* length of cutter channel, and not just at one point. Screw-operated jaw runs right to cutting edge and hugs bit so it can't slip, can't sag, can't break!

Holds All Sizes and Shapes

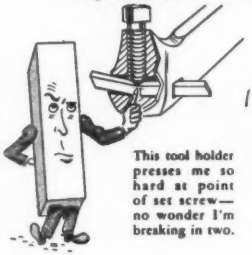
One Clark Adjustable Tool Holder takes 4 or more sizes of square, undersize, round or out-of-round, or narrow tool bits for cutting-off or special forming operations. Short bits and stub ends may now be used up.

For Carbide Tools and Boring Bars

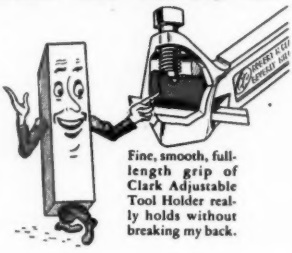
In addition to standard Clark Adjustable Tool Holder with 15° cutter channel, there's the Clark Parallel Tool Holder for better seating and better clamping action on carbide bits, threading tools, and boring bars.

For complete information about Clark Adjustable Tool Holder, call your Clark Cutter Jobber today, or write for catalog TDJ-7-TH

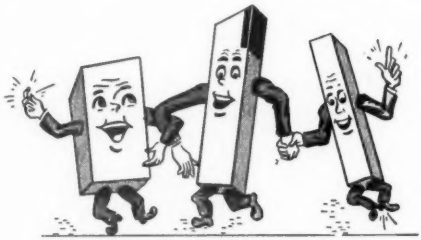
Change Now to Clark
Adjustable Tool Holder with Vise-Grip Jaw



This tool holder presses me so hard at point of set screw—no wonder I'm breaking in two.



Fine, smooth, full-length grip of Clark Adjustable Tool Holder really holds without breaking my back.



SHORT STUBBY

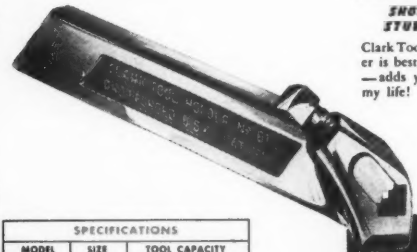
Clark Tool Holder is best for me—adds years to my life!

CARBIE CARBIDE

Boy! I like that extra support right to my cutting edge.

UNDER SIZE

Whee! Now I'm good for cutting-off or other operations.



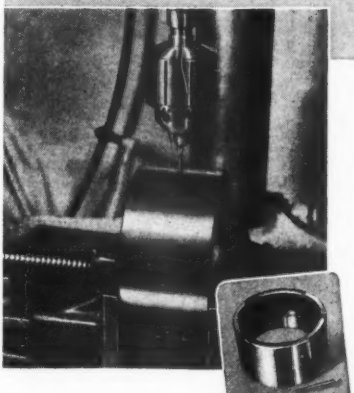
SPECIFICATIONS		
MODEL	SIZE	TOOL CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 5/8
With 15° or parallel cutter channel either left or right hand.		

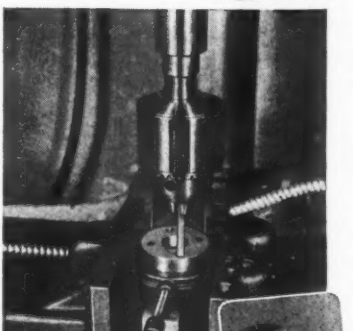
CLARK CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BOULEVARD • BEVERLY HILLS, CALIFORNIA

"HARDSTEEL" DRILLS





Save Time and Money by Reducing SCRAP

The ability of "HARDSTEEL" drills to drill any hardened steel has solved countless production problems, where holes must be made after hardening. They also prove invaluable in reclaiming dies, tools, or hardened parts which because of errors, hardening distortion or design changes were headed for the scrap heap.

Case No. 1—70 Bearing Races Saved

These roller bearing races were nearly completed when it was discovered that the oil holes had been forgotten. Made of SAF-52100 steel hardened to 60 Rockwell "C," no ordinary drill could make the four required 5/32" holes through the .048" wall thickness. Annealing and re-hardening was out of the question. *"HARDSTEEL" drills did this job easily and quickly, saving every piece.* To prevent "walking," a short drill at 2000 RPM started the hole, and regular length drill at 1900 RPM finished it. Coolant pumped to the work avoided discoloration.

Case No. 2—289 Cutters Saved

Hardening distorted the two driving pin holes beyond usable limits in 289 cutting tools. Scrapping them would entail a loss of $1445.00. To true up the holes by grinding would be a long and costly operation. Annealing and re-drilling presented the danger of warpage on re-hardening. *Three "HARDSTEEL" drills, costing only $19.26, saved every tool* by drilling two new holes, thus enabling delivery to be made on time. Material is 1.05 carbon steel, fully hardened to 60 Rockwell "C." The 15/64" holes, 3/8" deep, were drilled at 1900 RPM spindle speed under a flow of coolant.

Learn to drill hardened steels without annealing. Write for the "HARDSTEEL" operator's manual. Also inquire about "HARDSTEEL" as a metal—ideal for special parts or tools that must meet unusual conditions of service.

"HARDSTEEL"

DRILLS • TOOL BITS • SPECIALS

BLACK DRILL CO. • Division of Black Industries • 1400 E. 222nd St., Cleveland 17, Ohio

Less SET-UP TIME

More WORKING TIME

. . . . FOR YOUR PUNCH PRESS WITH THESE DICKERMAN FEEDS

These accurate, automatic feeds require no connection with the power shaft of your punch press. They save labor time and material waste, both for day-in-and-day-out production and on short runs.

The Dickerman Hitch Feed

1. Feeds from any position on any style die.
2. Saves time on both long and short runs.
3. Offers positive feed control, adjustable from 0" to its limit.

Made in two sizes, 2" and 4" Feeds
Send for booklet

The Dickerman Die Feed

1. Handles coiled stock up to ¼" thick, widths up to 4".
2. Adjustable from 0" to its maximum feed length in increments of .001".
3. Fasten three screws — and it's mounted on your die set.

Write for booklet

H. E. Dickerman Mfg. Co.

3217D ALBANY STREET — SPRINGFIELD, MASS.

How to apply API Precision Standards

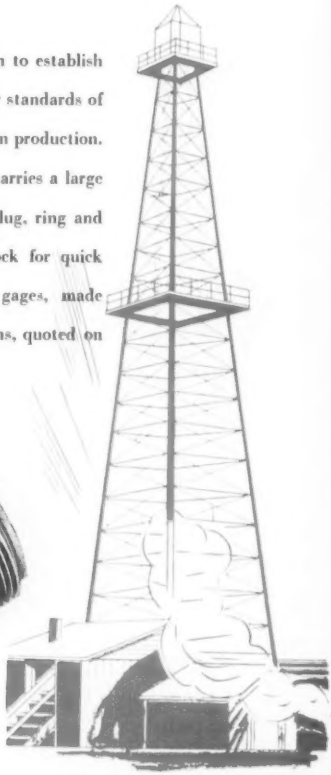
to your production

Careful planning and straight thinking by The American Petroleum Institute have combined to standardize precision throughout the important Petroleum Industry—with the highest uniform standards in any industrial field.

PM Gages have the seal of API acceptance. You can rely on their accuracy and their perfection of finish.

You can use them to establish and maintain higher standards of precision in your own production.

Pipe Machinery carries a large stock of standard plug, ring and thread gages in stock for quick shipment. Special gages, made to your specifications, quoted on request.



PMCO

ARMY E NAVY

The PIPE MACHINERY COMPANY Cleveland, O.

GAGES • MULTIPLE THREAD MILLING CUTTERS • SPECIAL TOOLS

HIGHER FINISHES-CLOSER TOLERANCES

with

NORTON 10-U LAPPERS

Lapping, frequently considered a slow hand operation requiring great skill, is now being done with high efficiency on present-day Norton Lappers, proving that a lapping machine can produce fine surface finishes on a production basis.

The Norton Engineering department will welcome the opportunity to work with you on lapping and grinding problems.

NORTON COMPANY
Worcester 6, Mass.

NORTON GRINDERS *and Lappers*

Vispeed

IS LIKE AN EXTRA MAN IN THE SHOP

Converts standard bench or swivel vise to fast, safe automatic production tool.

VISPEED eliminates awkward hand clamping — leaves both hands of the operator free. No need of a second operator to help handle clumsy parts, or to position parts to close register. Vispeed uses flexible air power, foot controlled, as the clamping force. Clamping force is adjustable from zero to two and one-half tons. Vispeed is safe. Jaws open to full standard capacity but air-powered movement is limited to 1".

Vispeed permits a flexibility in vise use that is amazing. Vispeed works so smoothly, so safely, so easily, that women operators can handle job after job formerly beyond their strength. Vispeed means faster, safer, better production in any shop.

The Bellows Co.

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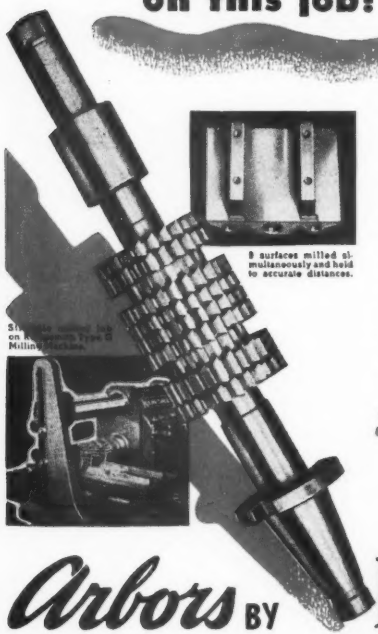
Yes Sir - we SAVED 10 HOURS on this job!



8 surfaces milled simultaneously and held to accurate distances.

"Instead of knocking down the cutter and arbor set-up for this straddle-milling job, we did the sensible thing—we kept the complete set-up intact, ready for the next production run. The initial set-up required 10 hours . so we'll again be saving that much time on the next lot."

Today, especially, it's vitally important to conserve production time. It takes many hours to reconstruct multiple cutter assemblies. Save this valuable time by laying aside the complete set-up for the next run. Have an extra supply of arbors on hand for this purpose. Remember, arbors are "perishable" tools and their cost today is relatively small. That's why —

It always pays to SAVE THE SET-UP!

Kempsmith Arbors are available in all popular sizes and types, adaptable to any make of milling machine with standardized spindle. Mail coupon for literature.

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Its rock-hard adhesive bond, much more resistant to operating heat, much less sensitive to humidity, gives 25% greater output at no increase in price.*

If you have not yet experienced the outstanding advantages of DURABONDED Coated Abrasives, get in touch with our nearest branch for a prompt demonstration on the toughest job you can select.

*This is a modest average. Many reports in excess of this figure are on file.

BEHR-MANNING
(DIVISION OF NORTON COMPANY)
TROY, N. Y.

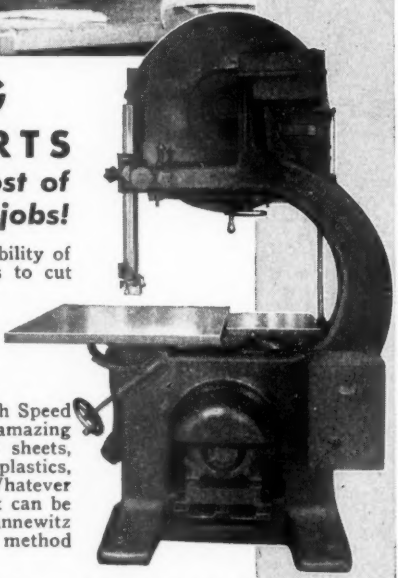
BRANCHES: Boston, Buffalo, Chicago, Cleveland, Cincinnati, Grand Rapids, High Point, Indianapolis, Detroit, Los Angeles, New York, San Francisco, Philadelphia, St. Louis, Tacoma.

The SUPER METHOD

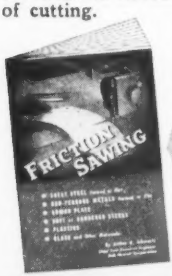
of TRIMMING FORMED PARTS

and performing a host of other metal cutting jobs!

The negligible down-drag and the ability of Tannewitz High Speed Band Saws to cut sheet metal from 90° to near 0 or 135° at tremendous speed make these machines ideal for trimming. Cuts can be made with perfect safety without using a rest of any kind.



Friction sawing with Tannewitz High Speed Band Saws also results in perfectly amazing time savings in the cutting of flat sheets, soft or hardened steels, armor plate, plastics, glass and many other materials. Whatever your cutting problem, chances are it can be done better and faster with Tannewitz Band Saws. Investigate this "Super" method of cutting.



FRICTION SAWING

with Tannewitz

HIGH SPEED BAND SAWS

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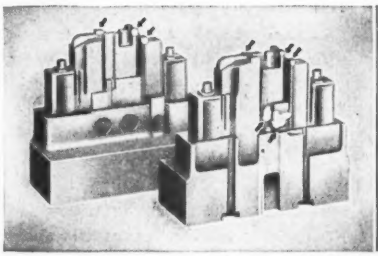
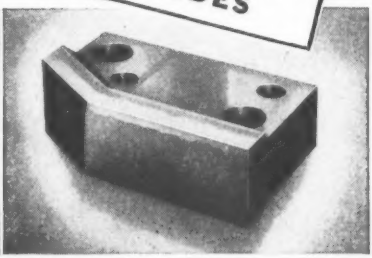
THE TANNEWITZ WORKS GRAND RAPIDS 4, MICHIGAN

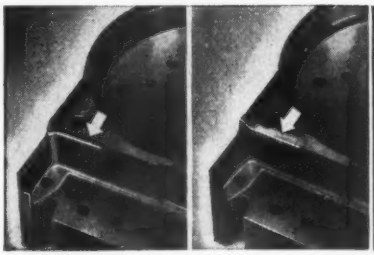
4 WAYS TO SPEED RECONVERSION WITH Eureka Tool & Die Welding ELECTRODES



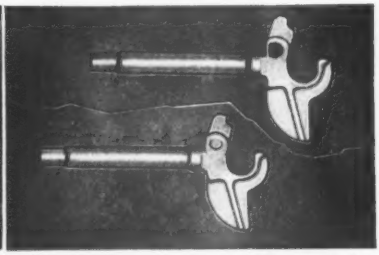
● Costly dies welded with Eureka Tool & Die Electrodes. These intricate units were saved at a small fraction of their replacement cost and were back into operation with minimum down-time. Man hours, material and production time saved.



● When practical, die units can be compositely fabricated by welding. Above die units compositely constructed with Eureka Tool & Die Electrodes. Heat treatment unnecessary, other than tempering. Last operation is finish machining.



● Design corrected or error rectified using Eureka Tool & Die Welding Electrodes. Weld deposit is roughly finished. You can make change in contours, corners or edges to correct design during die "try-out" or during "change-over" periods.



● Here is how welding rectified mistake in machining a new forging die. Error was corrected by building up with Eureka "Drawalloy" Electrodes, thereby saving $500 in time and material and eliminating unsatisfactory inserts.

EUREKA STEEL ELECTRODES FOR EVERY KIND OF TOOL AND DIE STEEL

Welding Equipment & Supply Co.

PIONEERS IN TOOL AND DIE WELDING ELECTRODES

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AMMCO 7" SHAPER

A precision machine for precision work . . .

Phenomenal performance of this precision shaper in war production work is an indication of its great value in the postwar period when your competitive conditions put added importance on accuracy and low-cost production . . . The precise accuracy of work turned out on an Ammco 7" Shaper assures precision production unsurpassed by larger machines selling for hundreds of dollars more than the Ammco . . . In addition to low initial cost, you also effect big savings in time and expense on set-up operations . . . You save on electrical power consumption . . . You save on floor space—all without sacrificing quality or accuracy . . . Available for bench installation, or as a portable unit.

Write today for specifications and prices

AMMCO 2100 COMMONWEALTH AVENUE
NORTH CHICAGO, ILLINOIS

Heat Treat Your Own Small Parts...

SAVE TIME AND MONEY THESE 5 DIFFERENT WAYS

This small compact electric furnace is inexpensive, handy and easy to operate—ideal for small tool and die shops—saves time these five different ways:

1. Eliminates delays in sending small machine parts out to overcrowded commercial heat treaters.
2. Saves time and expense of drawing or tempering small metal parts in large furnaces.
3. Cuts handling time when normalizing or annealing small parts. No waiting.
4. Conveniently available for pre-heating for subsequent high-speed hardening.
5. Eliminates shut downs and delays in servicing emergency repair orders.

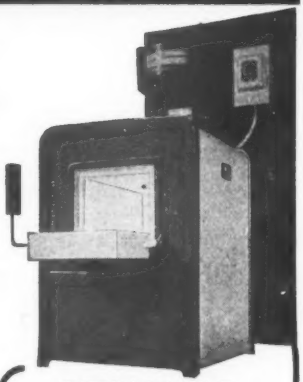
AVAILABLE IN TWO SIZES

Type	*Chamber Capacity*	*Amps 115 V*	*Watts*	*Amps 230 V*	*Price*
MH-3	8"W 6"H 14"L	29.6	3400	14.8	$124.00*
MH-4	10"W 6"H 18"L	....	4800	20.9	$191.00*

**Includes Hearth Plate*

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—$152.40.



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Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel — furnace structure remains undisturbed.

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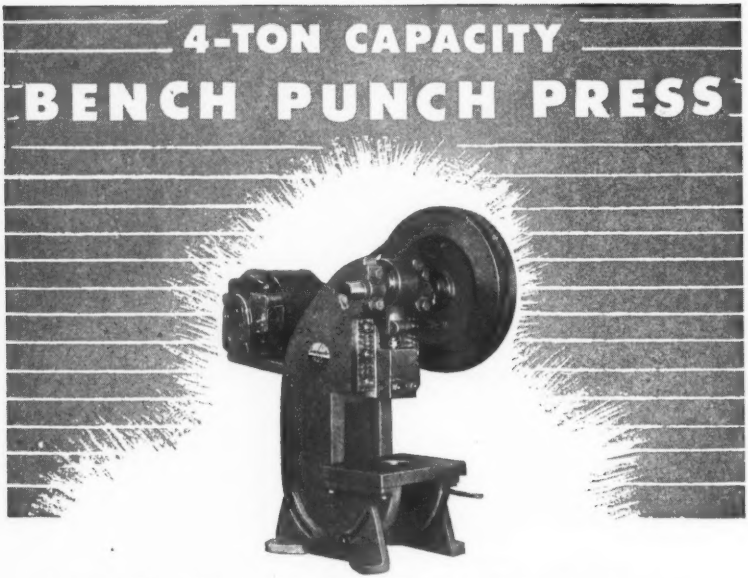
4-TON CAPACITY
BENCH PUNCH PRESS



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benchmaster—known for quality bench machine tools—aids high speed production with a versatile inclinable 4-ton capacity bench punch press.

For Light Sheet Metal, Plastics, Etc.

285 strokes per minute • Die Space: 4¾" when Ram "Up" • Ram Adjustment: 1 inch • Bolster Plate: 6"x 8" • Height: 25" • Weight: 185 lbs. • Motor: ⅓ H.P. • $127.50 F. O. B. Factory (less motor)

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tools

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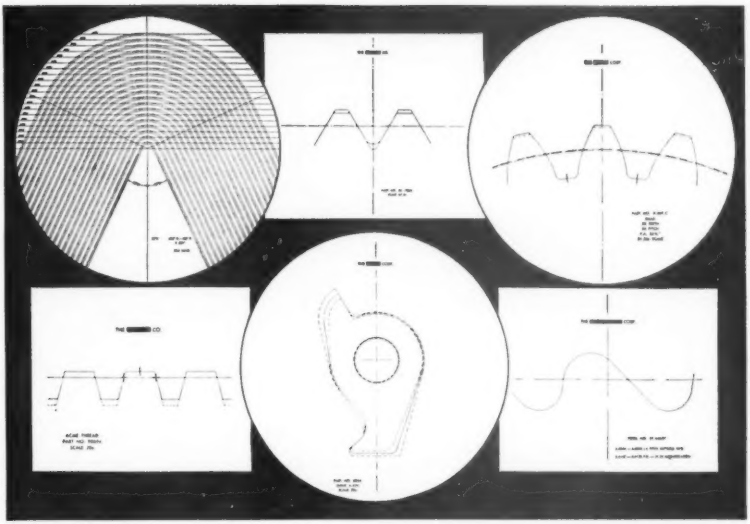

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Universal Comparator Charts made to your specifications for use on optical comparators, micro or measuring projectors will save you time, money and speed your inspection.

There are also available many standard Charts, Rules and Scales.

All are precisely made on finely ground selected plate glass and can be depended upon to maintain their original extreme accuracy.

Your request for estimates or for descriptive literature will receive prompt attention.

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TWIN PLANTS

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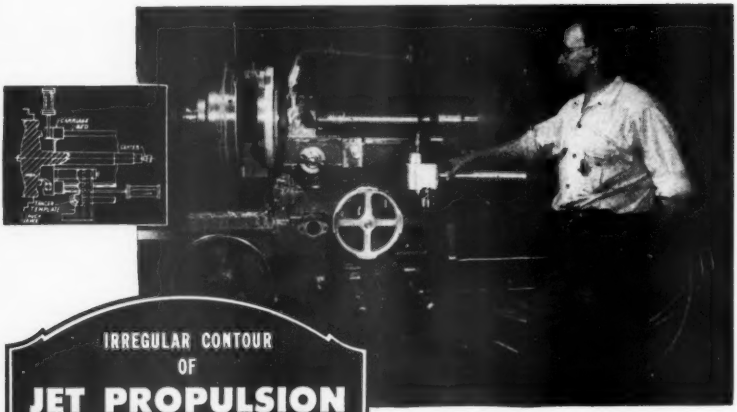

IRREGULAR CONTOUR
OF
JET PROPULSION WHEEL
NOW PRODUCED
WITHOUT GRINDING!

FASTER PRODUCTION!

PRODUCING the irregular contour of a jet propulsion engine wheel entirely free from ridges, and with such a high polish that no grinding operations are needed to complete the job, is the latest sensational achievement of the Turchan Hydraulic Follower Attachment.

Using only a ⅛" template as a guide, it enables a heavy duty lathe, equipped with hydraulic controls on both carriage and cross feed, to reproduce the contour on the 2' diameter wheel with a single cutting tool, performing the operation in a fraction of the time that forming tools would require. The same method is also being followed by a large manufacturer of jet propulsion engines in the production of impellers and impeller housings—with phenomenal savings in time and labor.

"Turn to Turchan"

SEND FOR PRODUCTION ESTIMATE

The Turchan is equally applicable to milling machines, planers, grinders, shapers and boring mills. If you have a postwar profiling job, send us a part print and we will give you an estimate of the increased production that you can get from any specific machine by equipping it with a Turchan Follower. No obligation.

TURCHAN

TURCHAN FOLLOWER MACHINE CO.
8257 Livernois • Detroit 4, Mich.

Hydraulic Follower Machine

● In addition to making a complete line of standard die sets, we are especially well equipped to produce special die sets to your specifications. Send us your prints for prompt action—or call the "Detroit" man in your area.

DETROIT DIE SET CORPORATION

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CALL "DETROIT"

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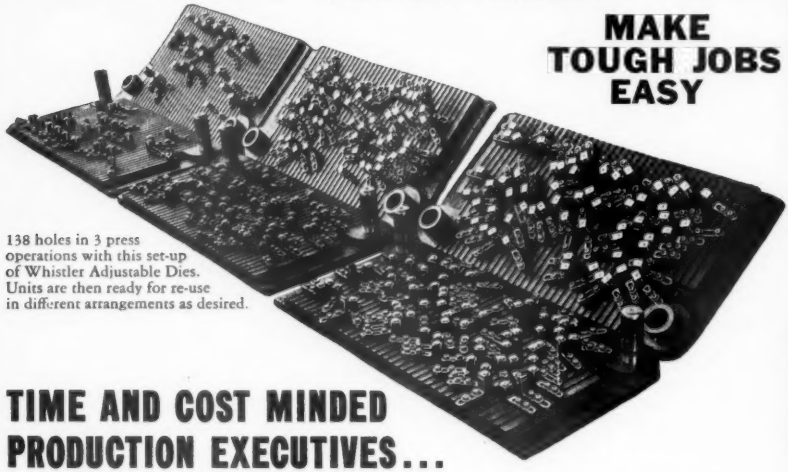
DETROIT DIE SETS ★

WHISTLER PERFORATING – NOTCHING SLOTTING – ROUNDING DIES

MAKE TOUGH JOBS EASY



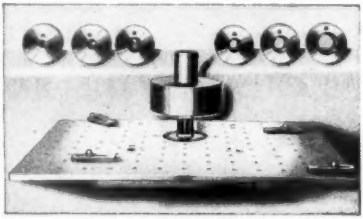
138 holes in 3 press operations with this set-up of Whistler Adjustable Dies. Units are then ready for re-use in different arrangements as desired.

TIME AND COST MINDED PRODUCTION EXECUTIVES...

have long been in the habit of consulting Whistler when it comes to dies for work on sheet metals.

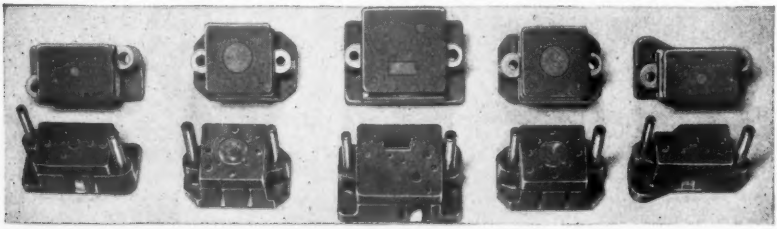
A leading Whistler achievement in reducing die-making and production costs is the multi-use Adjustable Perforating Dies which enable most set-ups to be made from stock units. The Single Hole Perforator, another Whistler development, presents new advantages in quick changes and a wide range of hole sizes. In fact Whistler adjustable dies, group dies and single purpose dies have contributed greatly to the production achievements of the nation's leaders in practically every line of manufacture. Write for the Whistler catalogs and get the entire story of how to reduce manufacturing costs and get into production faster.

Illustrated below, ready for production, is the Whistler Single Hole Perforator set with punch and die adaptor rings for perforating $\frac{1}{32}$" to $1\frac{1}{2}$" in mild steel to and including $\frac{1}{4}$" thickness when used with Whistler punches, dies and strippers.



S. B. WHISTLER & SONS, Inc. 752-756 Military Road, Buffalo 17, N. Y.

Group dies and special shapes to order. Often used on the press in combination set-ups with Whistler Adjustable Dies.



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MICHIGAN 7230

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VERNON HORIZONTAL MILLING MACHINES

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•

THESE QUALITY MACHINE TOOLS
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AND SOLD BY SHELDON DEALERS AS

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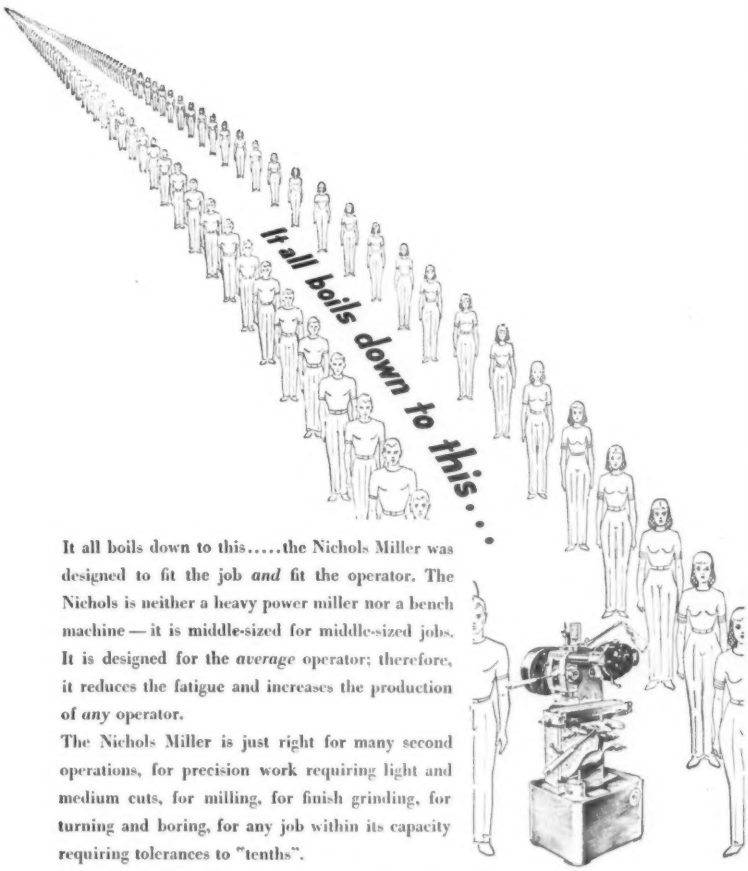
Descriptive circulars will be sent if requested of the Sheldon Machine Co., Inc. 4258 N Knox Ave., Chicago 41, Ill.



It all boils down to this.....the Nichols Miller was designed to fit the job *and* fit the operator. The Nichols is neither a heavy power miller nor a bench machine — it is middle-sized for middle-sized jobs. It is designed for the *average* operator; therefore, it reduces the fatigue and increases the production of *any* operator.

The Nichols Miller is just right for many second operations, for precision work requiring light and medium cuts, for milling, for finish grinding, for turning and boring, for any job within its capacity requiring tolerances to "tenths".

If your precision work requires short cuts, it requires Nichols precision and speed.

This new catalog on the Nichols Miller is free for the asking.

THE *Nichols* MILLER

MANUFACTURED BY W. H. NICHOLS & SONS, WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS: NICHOLS-MORRIS CORP., 40 CHURCH ST., NEW YORK 7, N. Y.

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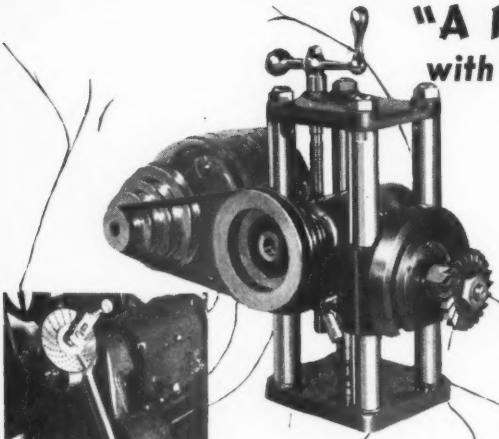
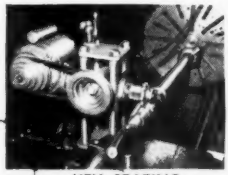
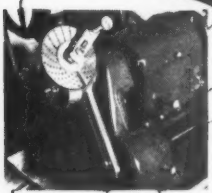
with Nimble Fingers

FOR MAINTENANCE
AND
PRODUCTION MEN

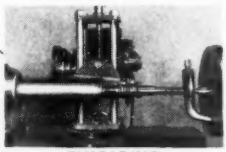




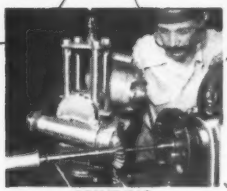
KEY SEATING



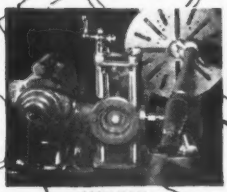
DIVIDING HEAD



THREADING



GRINDING



MILLING

THE MASTER LATHE CONVERTER

VERSATILE . ACCURATE . FAST!

Maintenance and production men are constantly called upon to repair a broken part or make a new tool. Speed is imperative. Shut-downs and production delays are costly. More often than not the needed part or tool requires a great many different machine operations, more delays. Pulling single purpose machines out of regular production and setting them up for special operations adds more cost.

The answer is: the Master Lathe Converter — it's portable, compact, simple, and accurate. The interchangeable heads can be quickly adjusted to perform almost any metal operation. For versatility, accuracy, and speed, equip with a Master Lathe Converter!

Catalog No. 10 includes Operating and Maintenance Manual — ASK FOR IT

the MASTER MANUFACTURING COMPANY
HUTCHINSON, KANSAS, U. S. A.

MM
LATHE CONVERTER

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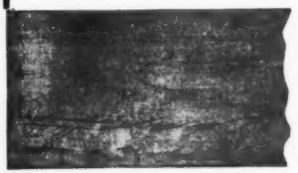
What is DIE-LESS DUPLICATING?

Here is a simple 3-STAGE explanation:

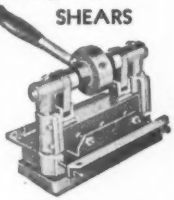
"DIE-LESS DUPLICATING" might be described as a new industrial technique made possible by the accuracy, extreme adaptability and ease of operation of DI-ACRO Precision Machines—Shears, Brakes, Benders —especially when used as a continuous, integrated production process.

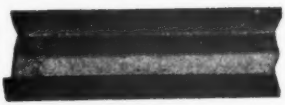


←1ST STAGE . . .

Cutting flat material to size and shape for part to be duplicated. The DI-ACRO shear rapidly resizes and squares material, also makes slits, strips, notches, angle cuts, etc. Guides, stops and blade pitch are all quickly adjustable. 3 sizes—shearing widths 6", 9", 12".

SHEARS





←2ND STAGE . . .

Forming angles, channels or "Vees" from sheared flat material. The DI-ACRO Brake forms any angle from 0° to a maximum of 110°. Contact surfaces are adjustable and may be slotted, recessed or altered as needed for the parts required. 3 sizes—folding widths, 6", 12", 18".

BRAKES

←3RD STAGE . . .

Bending sized and formed material to simple, compound or reverse curves of desired radii. The DI-ACRO Bender handles angle, channel, moulding, rod, tubing, wire (round, square, flat), strip stock and other ductile materials in a remarkably wide range of accurate contour forming. 3 sizes—radius capacity 3", 6", 9", handling up to ⅝" cold rolled steel bar.

BENDERS

DO YOU HAVE DUPLICATE PARTS TO FORM? . . . .

The DI-ACRO System of METAL DUPLICATING WITHOUT DIES has proven its adaptability in making parts just as accurately as can be done with dies, to a tolerance of .001" in all duplicated work. The delay of waiting for dies is avoided—deliveries speeded up. Changes needed in production can be made simply by adjustment of DI-ACRO Precision Machines, which are also widely used for laboratory and research work, making models, etc. Production work is often done in excess of 1,000 operations per hour, by girls or inexperienced workers.

←Pronounced "DIE-ACK-RO"

Send for Catalog—
"DIE-LESS" DUPLICATING

It gives full details on all models of DI-ACRO Shears, Brakes, Benders, and many examples of parts made with "DIE-LESS DUPLICATING".

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O'NEIL-IRWIN MFG. CO.

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5 TO 20 TIMES THE WEAR WITH STELLITE

Being basically different from the metal in the part being gaged, and having a low coefficient of friction and extreme resistance to abrasion, Cadillac Stellite Gages outlast ordinary steel gages 5 to 20 times.

In an armament application in which abrasive had become embedded in the part during the thread grinding operation, Cadillac Stellite Gages checked—accurately—30 times as many parts as the gages previously used.

This high resistance to wear reduces gage costs 50% to 80% and may accomplish even greater savings in reducing the number of parts rejected because of faulty gaging with worn gages. Try Cadillac Stellite on your *tough* gaging jobs.

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Speed Up Production with

MULTIPRESS

the four-ton giant in midget form

If your war production requires up to 4-ton pressing operations . . . for staking, crimping, punching, bending, assembling, or whatever . . . MULTIPRESS can speed it! There are mechanically and automatically controlled MULTIPRESSES. In the mechanically controlled type, illustrated here, there are three different ram actions to choose from . . . and if pressing enters into your production, one of these three actions will very likely fit it and speed it!

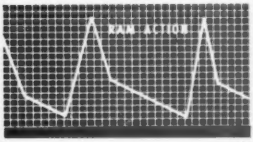
Basic Unit
$575.00

* Patents Applied fo

1 "Basic" MULTIPRESS offers simple, accurate and positive control of ram action through every phase of the pressing operation. Fully depressing the control levers effects rapid ram movement (200 ipm). Slow movement of the control levers affords gradual acceleration and deceleration of ram movement. Slightly releasing hand pressure upon either lever, stops the ram wherever it may be in its downward travel, and work may be positioned accurately beneath it. Releasing

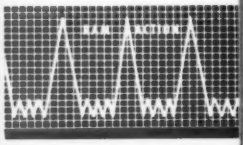
both levers causes the ram to rise to its upper limit and stop.

2 "Multi-Speed" MULTIPRESS offers rapid approach of ram to work, and adjustable pressing speed. Fully depressing the control levers brings the ram to the work at a speed of 200 ipm. Slightly raising the levers slows the ram at once to any



pre-selected pressing speed between 20 and 200 ipm. A simple knurled-knob and lock-nut permit easy and accurate pressing speed adjustment. Thus, Multi-Speed means faster production and ability to adjust pressing speed to the characteristics of the material being processed.

3 "Vibra-Press" MULTIPRESS is unique in its ram control and action. Depress-



ing the hand levers causes the ram to descend, exert pre-selected pressure on the work and then make any number of repeated pressure strokes upon the work until the levers are released . . . and those strokes are precision-timed and accurately uniform as to pressure, which may be preset anywhere between 1,600 and 8,000 pounds. Repeat strokes are adjustable in length from a few thousandths to 1/2-inch; by means of an easily adjusted knurled-knob and lock-nut.

In all models, single hand-lever or foot-pedal control may be substituted for the dual hand-levers, and ram travel may be adjusted anywhere between 1/16-inch and 6 inches. Maximum daylight opening between ram and table is 11 inches. Maximum stroke 6 inches. Matching benches, table extensions, side shelves, and a variety of bolster plates are available. Write for details of MULTIPRESS, the production giant with amazing ram action control!

The DENISON Engineering Co., 1197 Dublin Rd., Columbus 16, Ohio

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EQUIPMENT for APPLIED
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SEND TODAY *for this compl*
bulletin on the new **MULTIPRE**

Hy-Draulic Shaper, with unusual tool mounting, does fine work on complicated special ordnance parts.

Hy-Draulic SHAPERS

Save Time on Tool and Die Work

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

4413

Illustrated is a Hy-Draulic Shaper working on special ordnance parts machined from the solid out of very tough steel. The toolmaker running this shaper can concentrate completely on the work in process. Right under his hand are controls for rapid traverses in four directions and for hydraulic cutting speeds and feeds. He can get any cutting speed or feed whatever, in specified ranges, without gaps between, without gear-shifting, without stopping the machine. He can get ram-stroke length, and its position relative to the work, in one easy operation without cranking or using tools. These, and other Hy-Draulic advantages, save operator's time, speed production and promote economy on fine tool and die work . . . on run-of-mill shaper operations also. Investigate. See what Hy-Draulic Shapers can do on your work. Write us for name of nearest dealer, and ask for Bulletin 2506.

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THERE IS A PRODUCT BY "CARBORUNDUM" FOR EVERY ABRASIVE APPLICATION!

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"AIRGRIP'S" Two-Fisted Gripping Power Eliminates Slow, Costly Manual Chucking

"AIRGRIP" Chucks cut machining costs—save time spent laboriously releasing chuck by hand—reduce set-up time.

Also, "AIRGRIP'S" two-fisted action provides double gripping power . . . air PLUS a two-way cam-wedge action. Locks jaws mechanically when gripping externally or internally. Even if air supply fails, cam-wedge locking power holds work securely, prevents accidents.

To push output *up* . . . to push production costs *down* . . . equip your lathes with "AIRGRIP" Chucks!

"AIRGRIP" Non-Rotating Cylinders

For controlled lift or grip, push or pull, use "AIRGRIP" *Dual Action* Non-Rotating Cylinders. No skilled labor required to take apart; *no tie-rods;* either end of cylinder can be removed. Piston packings graphite-treated; require no adjustment; wear automatically taken up by air pressure.

"AIRGRIP" Revolving Air Cylinders

Cut maintenance costs! "AIRGRIP" Revolving Cylinders will operate for years without attention—wear is automatically taken up by air pressure within cylinder. No manual adjustments. Patented double ball bearings permit speeds formerly impossible.

OTHER ANKER-HOLTH COST REDUCERS

Include Air Operated Collets, Arbors, Mandrels, Drill Press Chucks, 2- and 3-Jaw Finger and Compensating Chucks, Revolving Air Cylinders, Lubricating Assemblies, 3- or 4-way Air Valves (hand or foot operated), etc. Also Hydraulic Power Units and Fittings.

Write, mentioning Products on which you desire Bulletins

ANKER-HOLTH MFG. CO.

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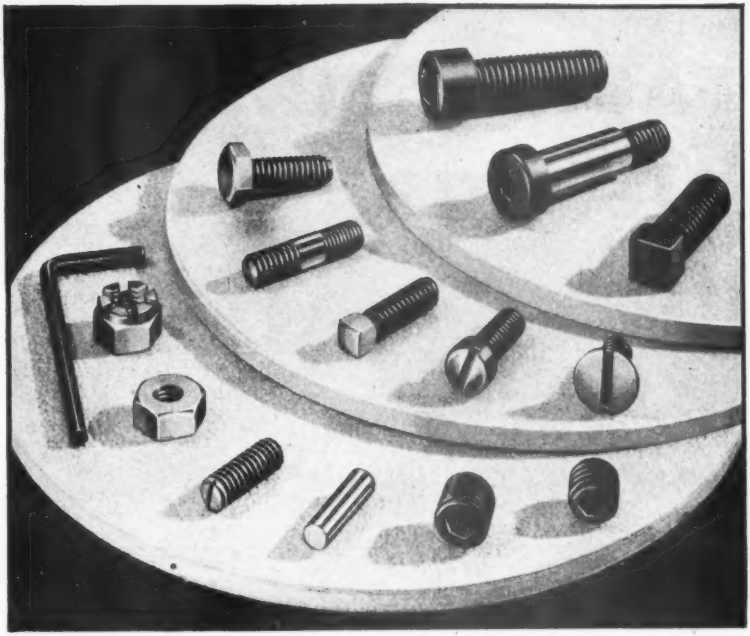
When buying new lathes, specify "AIRGRIP" Chucks and Cylinders



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"Chicago" Standard Screw Products are accurately made of finest quality materials, and are available to you through our selected distributors.

Authorized distributors carry complete stocks of all items in this line... Sturdy cardboard packages, clearly labeled and carefully packed, protect "Chicago" Standard Products from the time they leave our factory until they are required for actual use. You can count on a standard of quality which is sure to satisfy.

ARMY E NAVY

These Fine Products are sold only thru Authorized Distributors

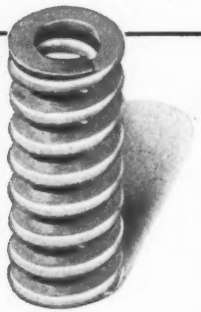
THE CHICAGO SCREW CO.

ESTABLISHED 1872

1026 So. Homan Avenue Chicago 24, Ill.

FASTER, FINER DIE WORK

By using the Die Spring Tailored for the Job



WARTIME die work demands greater speed and accuracy. You can meet this demand by using the die spring tailored to the job... and to the press. Customized die springs for each particular requirement are available at Muehlhausen; in series "S" for high speed, "M" for regular speed, and "HD" for heavy duty presses. Over 200 sizes are stocked, ranging from 1 to 15 inches in length, from ¾ to 4 inches in diameter, and from 80 to 3000 lbs. in load capacity.

MUEHLHAUSEN SPRING CORPORATION
Division of Standard Steel Spring Company
875 Michigan Avenue, Logansport, Indiana

WRITE FOR *FREE* DIE FOLDER!

Illustrates and describes die springs in 206 sizes and types.

Muehlhausen Spring Corporation
875 Michigan Avenue,
Logansport, Indiana
Send Die Spring Booklet, Free.

Name_____

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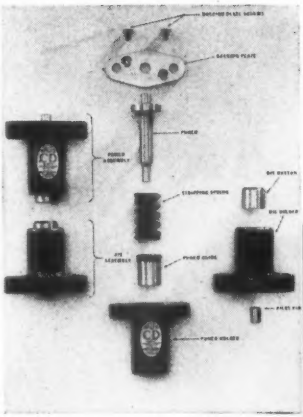
MUEHLHAUSEN SPRINGS

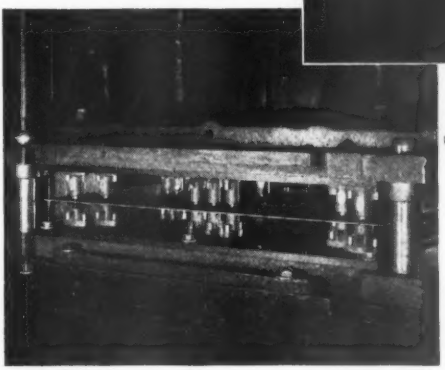
EVERY TYPE AND SIZE



Showing all parts of Wales Type "CD" Units assembled and disassembled. These parts are easily assembled and disassembled for quick changes.

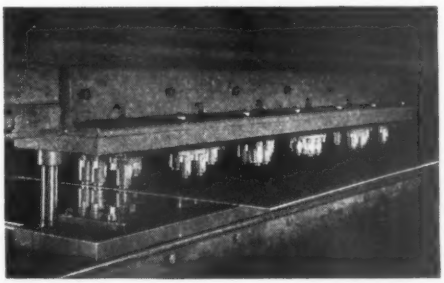
SIMPLIFY...
STANDARDIZE...
SAVE WITH...

WALES
TYPE "CD"
HOLE PUNCHING UNITS



Illustrating the work being punched with stamping press ram in down position.

Showing the work in a press brake set-up. Note unobstructed feeding of the work.



● The customary expensive and time-consuming methods usually associated with building a single purpose die to punch a multiplicity of holes *is eliminated* with Wales Type "CD" Hole Punching Units.

SAVE making special punches and punch plates, special stripper plates and special die buttons and die plates.

SIMPLIFY die design and die making.

STANDARDIZED Wales punches, dies, and stripping mechanisms permit units and parts to be carried in stock for setting up and servicing.

Write TODAY for functionally colored, 32-page catalog with 48 illustrations showing these Units being set up and operating in stamping presses and press brakes.

WALES-STRIPPIT CORPORATION

355 Payne Avenue
North Tonawanda,
New York

(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President
Specialists in Punching and Notching Equipment

Precision-Made for Precision Work!

MICROMETER ADJUSTABLE

BORING BARS

Designed for rough, semi-rough or finish boring. Chrome nickel steel heat treated and hardened.

Double Cutter

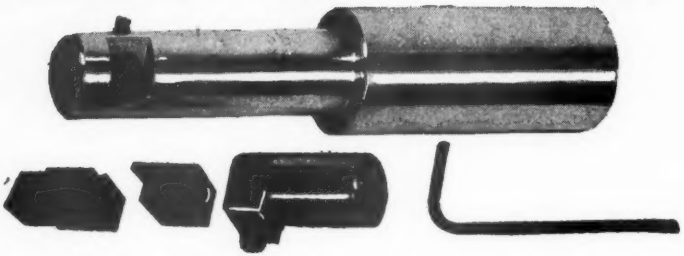
★ Accurate micrometer adjustment for diameters.
★ One set screw locks both cutters.
★ Cutters are identical, permitting interchangeability.

Fly or Single Cutter

★ Accurate micrometer adjustment.
★ Cutters are interchangeable with Double Cutter Boring Bar.
★ Cutter is locked in place with set screw.

MICROMETER ADJUSTABLE

BORING BAR INSERT



★ Shoulder in insert maintains accurate location point.
★ Insert can be installed on any bar available by a simple boring and milling operation. Inexpensive and simple to install. Print sent for making your own bar.
★ Cutter individually locked by sturdy set screw.
★ Micrometer adjustments are accurate and reliable.

Available in standard sizes or to your specifications

PROMPT DELIVERY

Write for complete details

ACME TOOL CO. 196 CHURCH STREET NEW YORK 13, N.Y.

No matter how tough the job, there's a

KRW HYDRAULIC PRESS

that can do it CHEAPER and BETTER

Illustrated are a few of the many adaptations of the famous KRW Hydraulic Press which is doing a variety of pressing, forming, bending, straightening and closing operations for industry.

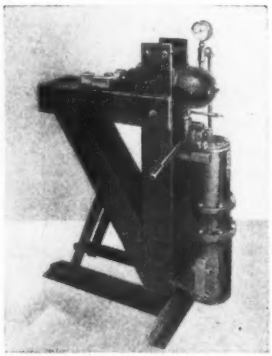
KRW Presses are adaptable to literally hundreds of special jobs. Using low-cost dies, manufacturing costs on many items are greatly reduced.
Using air pressure varying from 100 to 225 pounds, the resulting hydraulic pressure varies with the air pressure used. A built-in air regulator permits exact duplication of pressure on every stroke . . . this is important on many operations. KRW Hydraulic Arbor Presses are available for either vertical or horizontal operation or specially built to handle particular operation.

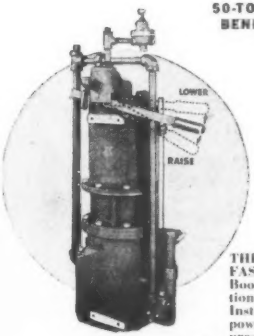
We also manufacture suitable capacity air compressors. Write for fully-illustrated Hydraulic Arbor Bulletin.

K. R. WILSON, 215-217 Main St., Buffalo 3, N. Y.

50-TON VERTICAL BENDING PRESS

SPECIAL FORMING AND BENDING





THE KRW SPEEDI-BOOSTER

THE REASON WHY KRW PRESSES ARE FAST AND ACCURATE. The KRW Speedi Booster eliminates the need for the conventional type Capstan wheel or pumping lever. Instead, it uses compressed air as the motive power operating the ram. Because the compressed air is controllable through a pressure regulator, any desired tonnage pressure at the ram can be obtained and duplicated. Ram movement (up, down or stop) is instantly controlled with the slightest fingertip movement of the lever.

LONG NARROW HORIZONTAL

SEND FOR THIS 24-PAGE ILLUSTRATED HYDRAULIC PRESS CATALOG . . . *full of valuable data*

PLEASE NOTE NEW ADDRESS

K. R. WILSON 215-217 Main St., Buffalo 3, N.Y.[18]
Please mail me a copy of your Hydraulic Press Catalog.
Name.....
Address.....
City..... *State*.....

K. R. WILSON
BUFFALO 3, NEW YORK

SCULLY-JONES

Style A

TAP CHUCKS

In a standard spindle with a Morse Taper Hole

In Scully Jones Floating Holder

In Floating Tension Type Tap Driver for Magic Chuck

In a Magic Quick Change Chuck

In a Spring Compression Tap Driver

Universally used for individual or modern mass production, the Scully-Jones Style "A" tap chuck is a one-piece tool designed for driving taps in any type of machine having a spindle holder or attachment with a Morse taper hole.

True-running, definite stop, positive drive smaller in diameter than spindle, quick insertion and easy ejection, are advantages that reduce tap breakage and speed up production.

Write for our complete listing of sizes.

5 Big FEATURES

STYLE "A" TAP CHUCKS

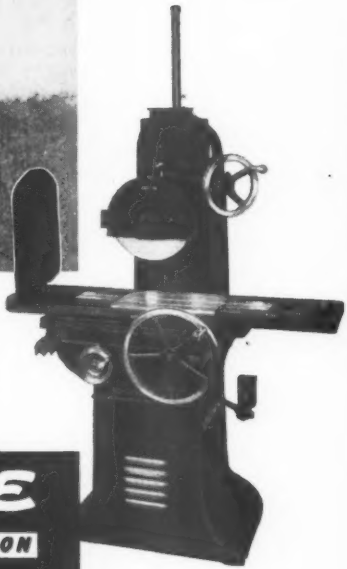
1. Drives By Square—a positive drive
2. Centers By Shank—for correct alignment
3. Collet Action—locks tap in chuck
4. Taper Shank—fits any M. T. hole
5. Four Point Bearing—gives collet action

Scully-Jones AND COMPANY

1901 SOUTH ROCKWELL STREET • CHICAGO 8, U. S. A.

Grinding has come a long way since we were boys

ABRASIVE NO. 1½



The **Abrasive** No. 1½ Hand Feed Surface Grinder is producing work today—in accuracy, speed and variety—that is as far from the product of the old grindstone as walking is from flying! The **Abrasive** No. 1½ is a versatile machine with unusual capacity for grinding dies, flat work and gauges . . . it combines accuracy with speedy production. Convenient, large handwheels make operation easy; motor built integral with wheel head completely eliminates belts, sprockets and chains . . . minimizes vibration. **Abrasive** design assures years of satisfactory service.

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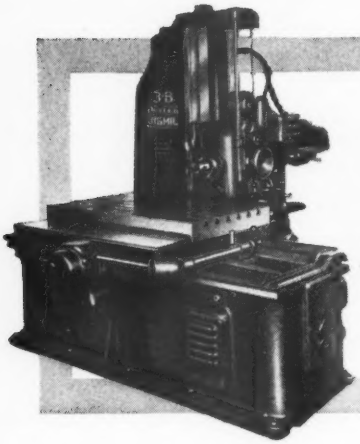
ABRASIVE

ACCURACY BOOSTS PRODUCTION

Capacity: 15" long, 10" wide, 12" high

ABRASIVE MACHINE TOOL CO. • EAST PROVIDENCE 14, R. I.



★

The JIGMIL has proven to be a totally new approach to the problems of economical precision BORING and milling . . .

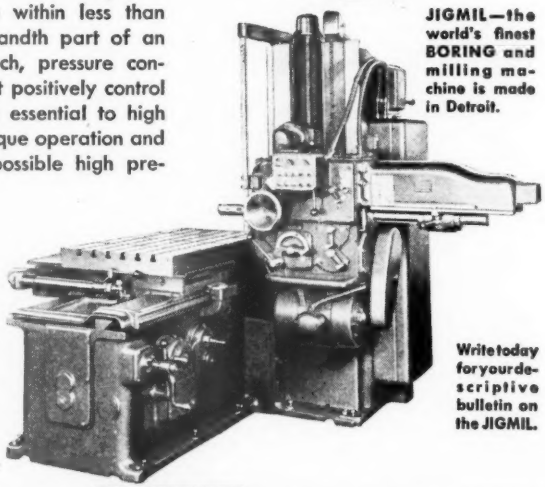
★

"TWO TO THREE TIMES the production and higher quality work" is what users are saying about the 3-B DeVlieg JIGMIL—and here are some of the reasons why the results are better: 1. Automatic positioning of spindle from one location to another in response to measuring rods and push buttons to within less than .0001 (one ten-thousandth part of an inch). 2. Feather touch, pressure controlled slide locks that positively control locking uniformity, so essential to high precision work. 3. Unique operation and controls that make possible high precision work with relatively little skill.

☆

The JIGMIL does most production boring and milling work faster and more accurately with rugged tools working in the open than is possible with the part trapped inside the walls of a boring fixture.

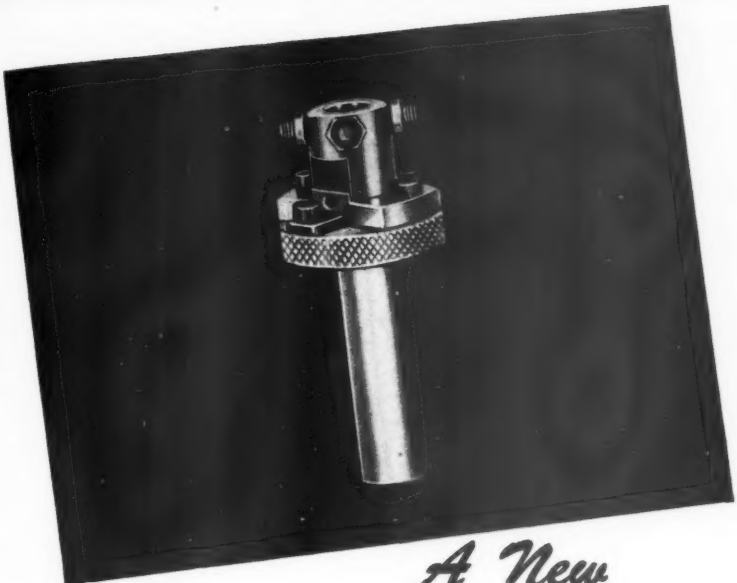
JIGMIL YOUR WORK



JIGMIL—the world's finest BORING and milling machine is made in Detroit.

Write today for your descriptive bulletin on the JIGMIL.

DeVLIEG MACHINE COMPANY DEVLIEG JIGMIL **450 FAIR AVE. FERNDALE 20, (Detroit) MICH.**



A New Precision Holder for Better Reaming

Here is a reamer holder built by reamer specialists, to bring to your turret lathes and screw machines, the full precision qualities inherent in L & I Ground Flute Reamers.

The L & I Precision Centering Reamer Holder establishes a new center absolutely true with the spindle axis, and drives the reamer from this dead center. *Reamer does not float* — but follows true centerline free from weight or pressure. No bushings — no bell-mouthing — no tapered holes — corrects diagonal errors in turrets.

Standard model holds reamers from 1/16″ to 7/16″ diameter interchangeably. Larger model for reamers 7/16″ to 1⅛″ diameter.

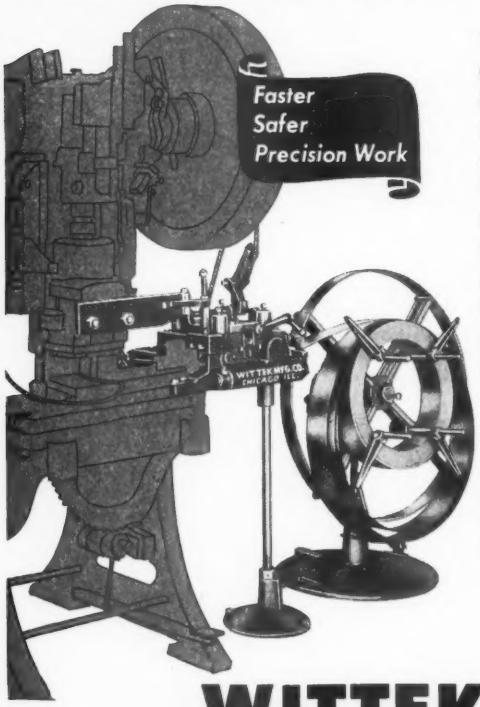
Write for bulletin giving full specifications and prices.

LAVALLEE & IDE, INC. • CHICOPEE, MASS.

L&I GROUND FLUTE REAMERS

Planning Peacetime Production Using Coiled Strip Stock?

Equip with
WITTEK
Automatic Roll Feeds and Reel Stands



Wittek Roll Feeds are being used extensively by war plants in their large volume production of high quality metal stampings. The flexibility of Wittek Roll Feeds will assist these plants in their peacetime conversion through their adaptability to various jobs. Keen competition will demand the utilization of equipment to its point of highest efficiency. If your postwar plans include punch press production of parts from coiled strip stock—investigate now the many possibilities of Wittek Roll Feeds and Reel Stands.

Write for catalog, prices and recommendations

WITTEK
MANUFACTURING CO.
4305-15 W. 24th Place, Chicago 23, Ill.

Automatic
ROLL FEEDS
AND
REEL STANDS

Cut your gaging costs . . .
USE PERFEX CARBOLOY GAGES!

Special Carboloy Gages and tools made to your specifications.

We are pleased to announce that the *Carboloy Company* has granted us a franchise to use carboloy in the manufacture of our gages.

We consider this as another big step forward in our continual efforts to offer the highest quality, longest wearing gage possible to produce.

LOOK AT THESE ADVANTAGES!

1. Gaging costs per piece is reduced.
2. Users report 15 to 20 times longer wear.
3. Lower inventories required.
4. Routine gage inspections can be greatly reduced.

Write for prices and delivery dates today

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ACCURACY PERFEX OUR CREED

LISTEN BROTHER, IF YOU WANT TO BE SURE THAT YOUR MACHINE IS SETTING ON AN EVEN **KEEL**, THIS LITTLE LEVELING JACK WILL SET HER RIGHT FASTER'N YOU CAN BAT AN EYE!

Empco JACK

TO KEEP YOUR MACHINE LEVEL

If you're setting up machine tools, special machinery, large surface plates, large assembly fixtures or tool room and production equipment, etc., you can save time *now* and much re-leveling time *later* by using *EMPCO machine Leveling Jacks.*

Immediate Delivery

SIZES AVAILABLE
No. 1...2 " normal height
No. 2...2⅜" normal height
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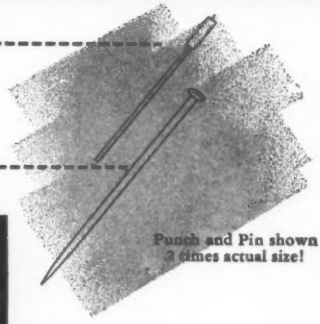
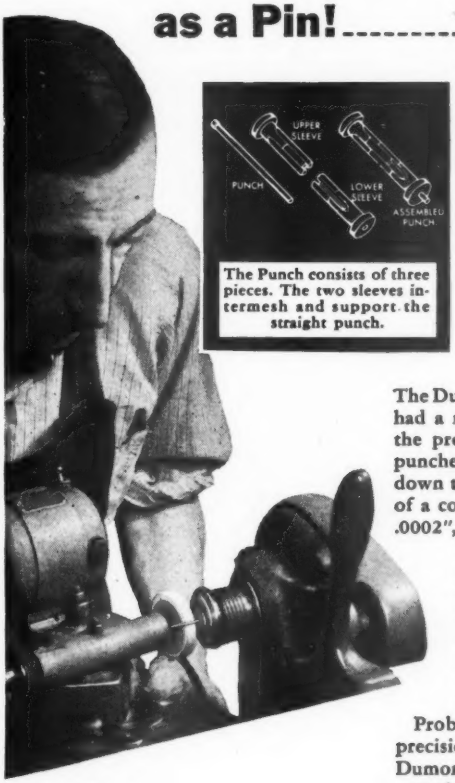
EMPCO

THE ENTERPRISE MACHINE PARTS CORPORATION
2735 JEROME AVE. DETROIT, MICH.

They Grind Punches Half as Thick as a Pin!



Punch and Pin shown 2 times actual size!



The Punch consists of three pieces. The two sleeves intermesh and support the straight punch.

DELICATE FINISHING PROBLEM SOLVED WITH DUMORE PRECISION GRINDER!

The Durable Punch and Die Co. of Chicago had a real precision grinding problem in the production of their unique piercing punches. Because their standard sizes range down to .015" diameter (half the diameter of a common pin) with tolerances held to .0002", a very accurate means for grinding is essential. After experience with practically every type of grinding equipment, they selected the Dumore Model No. 14 because its size was perfect for the work and its outstanding precision and freedom from vibration produced the fine finish required.

Probably you, too, have need for the precision, versatility and dependability of Dumore Precision Grinders—ask for our complete Catalog today! The Dumore Company, Tool Division, Dept. TG42, Racine, Wis. (Eastern Sales and Service Branch, 13 East 40th Street, New York 16, New York.)

Read *Shop Talk*—
Dumore's new magazine for shop men—write today!

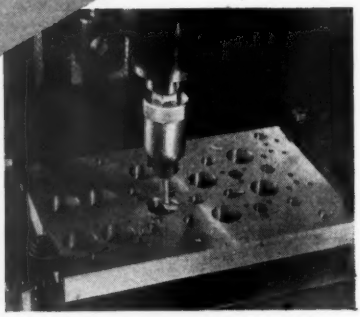
DUMORE
PRECISION AND HAND GRINDERS

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

HOW TO OBTAIN

increased speed AND *closer tolerances*

IN JIG BORING



NO S-T-O-P and S-T-A-R-T TO CHANGE TOOLS AT EACH HOLE

In the Moore Jig Borer you can *consecutively* spot, drill, bore and ream *all* holes in the work-piece with minimum tool changes. In other words, you don't have to change tools at individual holes for each operation, because there are no size blocks or end measures to labor over.

Accurate lead screws *built into* the Moore Jig Borer enable you to make table settings faster than you can change tools. A glance at your blueprint—a few turns of the micrometer dials and the work is set to precise location. Moore lead screws, accurate to .0002" over 14" of travel and .00005" in any given inch see to that. Another advantage—you make each setting three times, enabling you to quickly notice and correct any errors you may have made.

The Moore Jig Borer is ideally suited for jigs, fixtures, dies, special machine parts and jig-less, small-lot production. It is highly sensitive for holes 1/32" diameter, yet rugged for heavy cuts up to 4½".

RAPID TABLE SETTINGS PROMOTE GREATER ACCURACY IN FINISH BORING

Rapid table settings on the Moore Jig Borer encourage operators to follow the best toolroom practice—roughing *all* holes before finish-boring *any* of them.

Moore lead screws are so fast to set—faster than tool changes—that it *pays* to pre-rough all holes. Temperature changes or stresses caused by roughing cuts *cannot* interfere with finish-boring.

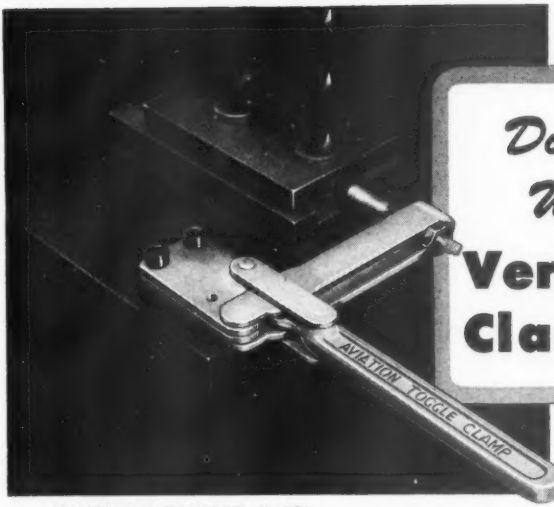
After roughing, the set-up can be easily checked and re-set before taking any finish cuts.

All finish-boring is completed without stressing or heating of the work-piece. These favorable conditions, maintained throughout the entire finish-boring operation, on the Moore Jig Borer, are further assurance of ultimate accuracy in the completed work.

Write today for descriptive literature

MOORE JIG BORER

MOORE SPECIAL TOOL CO., INC., 726 UNION AVE., BRIDGEPORT 7, CONN.



Do You Want Versatile Clamps?

APPLICATION OF MODEL KV-196

Here are two—typical of the score of clamps designed by Knu-Vise for increasing efficiency where holding is required.

The toggle bar of Model KV-196 (above) permits pressure spindle to be located anywhere along its length. When spindle is positioned at extreme end, pressure of 180 lbs. is obtained with only 30 lbs. pressure on handle.

The toggle bar of Model KV-216 (lower view), being solid, can be cut to suit your special needs. With a pressure of 70 lbs. on the handle a maximum pressure of 240 lbs. can be obtained ⅜" from end of toggle bar.

Send for illustrated catalog giving information on all types of toggle-action clamps available for your use.

BUY WAR BONDS

KNU-VISE
INCORPORATED

1330 Plum St., Detroit 16, Michigan
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Convenient warehouse service

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For Reconversion Tool and Die Steels

Toledo

We'd like to say, "Pick up the 'phone and call the nearest Latrobe Warehouse for the steel you want." But these are days when war production still has first call, and conversion tool and die steels will not always be available until the final victory. When they are, Latrobe's seven warehouses, together with sales offices in principal cities will be able to give you the best in prompt, efficient tool and die steel service.

Make it a habit to call Latrobe first.

Cleveland

Latrobe ELECTRIC STEEL COMPANY

S-4

MAIN OFFICES *and* PLANT •• LATROBE • PENNSYLVANIA

Assembly TIME SAVERS!

ARO

Pneumatic

NUT SETTERS and SCREW DRIVERS

Model 131 Impact Wrench. ¼" to ⅜" capacity. Reversible.

Model 106 Impact Wrench. ¼" capacity. Reversible.

Make your time-studies *now* on nut-setting and screw-driving operations with ARO Pneumatic Tools! Note the speed and big power of these small tools—with light weight that means less fatige on assembly jobs!

Whether it's ARO Impact Tools designed with Controlled Torque . . . or other ARO models for all types of small tool jobs . . . you can count on ARO Performance to keep costs down and production UP! Write for catalog. The Aro Equipment Corporation, Bryan, Ohio.

Model 1011 Impact Screw Driver and Nut Setter shown with No. 2 Phillips bit. ¼" capacity.
Model 22LPH Straight Type Nut Setter. Lever throttle. Capacity ¼"
Model 22PAH Pistol Grip Nut Setter. Capacity ¼"

ARO

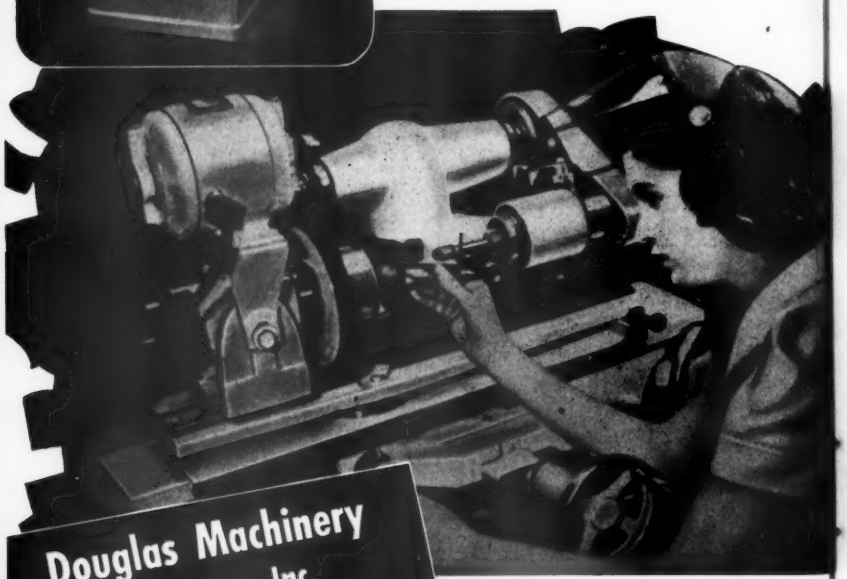
PNEUMATIC TOOLS

For Precision Grinding and Sharpening

ROTOREX UNIVERSAL GRINDER

TOOL ROOM • MODEL SHOP • PRODUCTION

8" x 15" capacity. Variable spindle speeds ranging from 4500 to 6000 R.P.M., making the machine flexible and particularly suitable for delicate grinding jobs. Readily interchangeable attachments for single purpose jobs such as cylindrical, internal, and radius grinding, makes the Rotorex Grinder a universal machine for all kinds of grinding and sharpening operations.



Douglas Machinery Company, Inc.
150 Broadway, New York 7

PROMPT DELIVERY

SHAPING FILLETS on metal parts or patterns — getting in behind overhanging lugs or projections — deburring or countersinking holes in hard-to-get-at places (like the inside of a tube) . . . these indicate the versatility of the Nicholson Ball Shape Rotary File operated by portable tool or flexible shaft.

The Ball is one of 16 shapes Nicholson regards as standard for covering all practical machine-shop applications of rotary files.

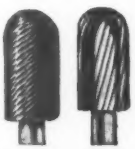
Each shape is offered in either Hand Cut or Ground type. The former, when no longer serviceable as such, can be converted into Ground type. The latter can be resharpened — usually a number of times — at slight loss of diameter.

WRITE FOR CATALOG AND PRICE LIST—and for any help desired in the selection of *The right file for the job.* For ordering, contact your mill-supply house.

NICHOLSON FILE CO., 95 Acorn Street, Providence 1, R. I.
(In Canada, Port Hope, Ont.)

16 STANDARD SHAPES

(in either Hand Cut or Ground). 3 cuts—Coarse, Medium, Fine. Diameters ¼ to 1⅛".



Hand Cut Ground

NICHOLSON ROTARY FILES
HAND CUT AND GROUND—FOR EVERY PURPOSE

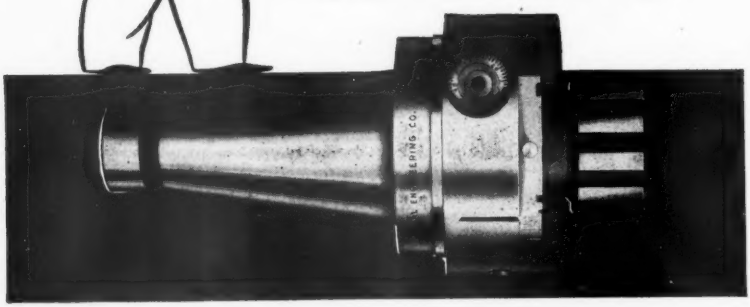
NICHOLSON U.S.A.

UNIVERSAL BORING CHUCKS GRIP TIGHT • IMPROVE ACCURACY • SPEED UP OPERATIONS

Universal Boring Chucks, made for boring mill and milling machine use, speed efficient boring at reduced cost because they are engineered to minimize chances for error and constructed to deliver dependable performance on the job year after year. Here are a few of the many advantages incorporated in the design and construction of these modern tools:

- Special design allows boring bar to be advanced or receded to a length to suit the work.
- All wearing surfaces hardened and ground.
- Anti-back-lash arrangement of adjusting screw permits extremely accurate setting of cut—accurate to .0005".
- Positive reference point to bring collet on center permits centering, drilling, etc., previous to boring operation.
- Flat retainers which grip slide are easily brought to proper adjustment by grinding face of chuck.
- Large feed dial can be adjusted to zero setting at any position in feed range.
- Made to accommodate bars from ⅜" to 1".

Write for complete particulars about Universal Boring Chucks and other superior Universal tools.



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN Fighter Plane Given by Employees Employee Bond Deductions

SIMPLIFY CHANGE-OVER with South Bend Lathes

Change-over from war production to the manufacture of civilian products is comparatively simple where versatile South Bend Lathes are used. Their adaptability permits getting new jobs into production quickly—with little inconvenience or loss of time. A complete line of practical attachments and accessories makes it easy to tool up the lathe for a wide variety of operations. Often, the use of special machines and fixtures can be avoided, thus preventing capital losses resulting from the inevitable scrapping of costly custom-built equipment with each change in product design.

WRITE FOR NEW CATALOG 100-D

Illustrates in full-color and describes South Bend Engine Lathes and Toolroom Lathes with 9", 10", 13", 14½", and 16" swings. Also, Precision Turret Lathes with ½" and 1" collet capacities.

SOUTH BEND LATHE WORKS

432 E. MADISON ST., SOUTH BEND 22, IND. • *LATHE BUILDERS FOR 38 YEARS*

Production

A surprising number of Cincinnati Shapers are on production jobs—they have stepped out of the tool room into the manufacturing shop... Here is a typical example of a Heavy Duty Cincinnati Shaper, using a simple fixture and forming tool, producing with economy and efficiency... There may be a spot in your shop where a Heavy Duty Cincinnati Shaper can be used with profit.

Write for our complete Catalog No. N-2.

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

FACTS PRO[illegible]

that you need [illegible] your plant

Records Su[illegible]

Deepfreez[illegible]

Cold Treati[illegible]

to Low[illegible]

OPERATION	PART	PERFORMANCE PRIOR TO COLD TREATMENT	PERFORMANCE FOLLOWING COLD TREATMENT
HARDENING	High Speed Drill	48 holes per grind	256 holes per grind
	Tap	40 pieces per grind	500 pieces per grind
	Milling Cutter	7 hours per grind	24 hours per grind
STABILIZATION	Pump Plunger	Operation unsatisfactory due to metal growth	Perfect operation indefinitely due to complete stabilization
	Gauge Blocks	Blocks expanded and warped	Blocks held original size and shape
	Lapping Plate	Resurfacing required every 2 to 3 hours	Resurfacing required every 2 to 3 days
SHRINK FIT	Airplane Landing Struts	20 minutes required for assembly	10 minutes required for assembly
	Tapered Roller Bearing Race	hour to insert in casing	minute to insert in casing

These performance records are typical of economies obtained in many of the nation's leading industrial plants by the use of Cold Treating in various production processes—economies which can be duplicated under similar conditions in your plant.

Cold Treating is used to accomplish a variety of purposes—all with equal efficiency and economy. Foremost among these are hardening metals and metal parts; stabilizing precision parts, gauge blocks, lapping flats, etc.; shrinking metal parts for rapid assembly; and testing of instruments and equipment for high altitude, low temperature operation. In addition, Cold Treating is performing a multitude of specialized operations too numerous to mention.

You, Too, Can Profit by Using Cold Treating

Whatever your production, a survey of the outstanding results obtained by applying sub-zero temperatures to industrial operations—a few of which are shown in the panel at left—is convincing proof of the economical value and utility of this newest "tool" for industry. Think what such results can mean to your operations in terms of production economies and improved quality of your product.

Let Deepfreeze Engineering Service Assist in Adapting Cold Treating to Your Production

If you are unfamiliar with industrial Cold Treating or are using it on a limited scale and are interested in increasing its range of utility, contact Deepfreeze Engineering Service. Our experienced refrigerating engineers will make a complete study of your product and production setup and enumerate the possibilities and advantages of applying it on the broadest possible scale. This service will not obligate you in any way.

FREE . . . Complete Cold Treating Information

This new 40-page booklet contains all of the facts necessary for a complete understanding of industrial Cold Treating. It explains in detail what occurs within a metal structure when cold treated; illustrates its many uses and resultant savings in time and money; lists up-to-date Cold Treating procedures, gives the names of manufacturers using Deepfreeze equipment; and numerous additional data which you need in applying it to your production. Write today for your copy of Bulletin No. I-4.

Clarkator

CHECKS DIAL INDICATORS

Micrometer speed with sine bar precision — the fastest, most accurate method ever developed for checking dial indicators! Clarkator gives 100% inspection on every vital point. Checks comparators, hardness testers and all other instruments requiring precision dial indicating.

The Clarkator is sturdily built for long trouble-free service. Easy to operate — just four simple steps! Complete operating instructions are permanently attached to base.

Be sure of absolute accuracy of indicator readings. Put Clarkator to work for you. Regular use will provide a saving in test results alone worth many times its low cost! Illustrated 2-color circular contains complete descriptions and specifications of the Clarkator. Write for your free copy today! Dept. TD.

CLARK

TOMORROW'S ACCURACY TODAY

HARDNESS TESTER

Clark Instrument, Inc., 10200 Ford Road, Dearborn, Mich.

T-J CUTTERS

Cut Costs... Speed Production!

For high speed work in tough die steels —or any cutting operation—you'll find T-J Die Sinking Milling Cutters unbeatable for *speed, accuracy* and *cost-cutting efficiency!* Correctly designed... made from a standard, extremely high grade steel... properly machined... scientifically heat-treated and accurately ground... T-J Cutters do a better job with *more work between grinds!* Try T-J for easier cutting, less breakage, and a faster feed rate—with old or new machines! Many styles and sizes. Send for new catalog... The Tomkins-Johnson Company, 620 Mechanic Street, Jackson, Michigan.

FOR TOUGH JOBS SPECIFY T-J

TOMKINS-JOHNSON

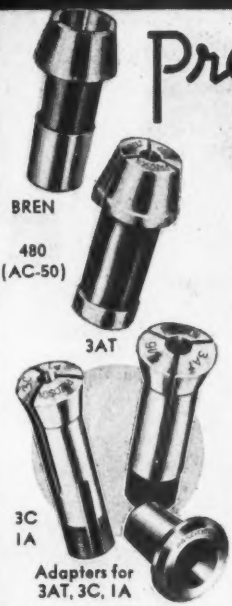
DIE SINKING MILLING CUTTERS

WHEN COLLET WORK IS INDICATED - SPECIFY

Precision Collets

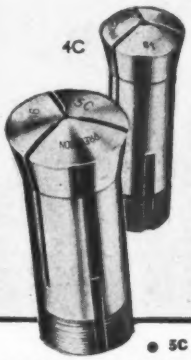
For 10" ATLAS & LOGAN, SOUTH BEND, SHELDON, CRAFTSMAN, POWR-KRAFT, CLAUSING and other important lathes.

IMMEDIATE DELIVERY FROM STOCK



The *Precision* name on a collet is your unconditional guarantee of accuracy in machining, hardening and grinding. Make sure then to specify *Precision* when ordering from your dealer. Literature on request.

- MODEL 3AT: For 10" Atlas, Logan, 12" Craftsman, No. 700 Powr-Kraft.
- MODEL 3C: For 8" & 9" South Bend, Clausing, Hardinge No. 3, 10" LeBlond, etc.
- MODEL 1A: For 8" & 9" South Bend.
- MODEL 5C: For 9", 10", 16", 18" South Bend, 1" capacity Sheldon, Schauer, Sebastian, etc.
- MODEL 4C: For 14½" South Bend, ¾" capacity Sheldon, Hardinge No. 4, Elgin, etc.
- MODEL 480: For Logan Screw Machine, Turret Lathe and attachments; Warner & Swasey No. 1, etc.
- BREN Collet: For Handwheel & Lever-Type Speedichuk.



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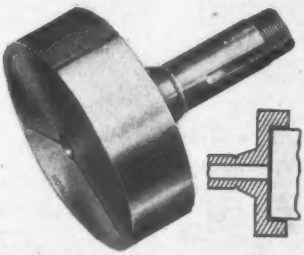

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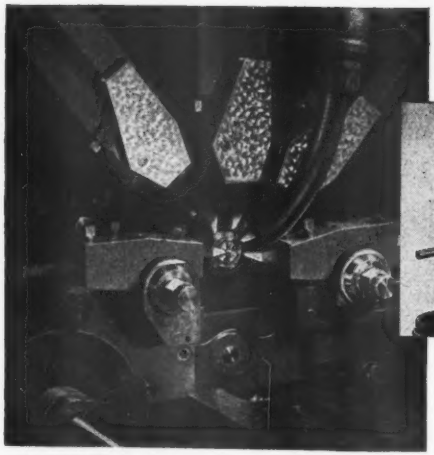

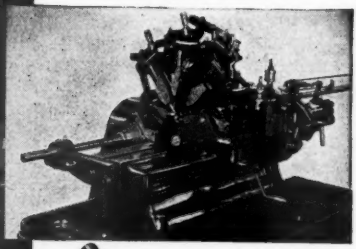

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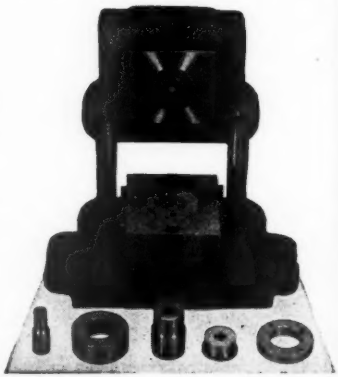

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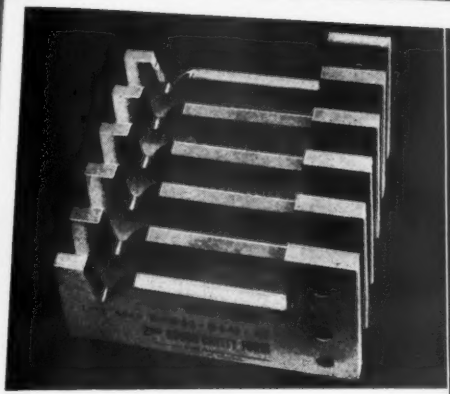

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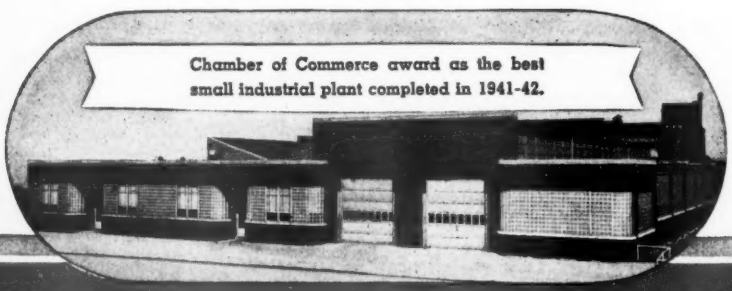

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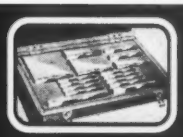

Webber GAGE COMPANY

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TOOL STEEL DATA

Revised data for High Speed Steels including types, analyses, uses, hardening characteristics and temperature ranges

(July 1945)

HIGH SPEED STEEL CHARACTERISTICS

TYPE	GRADE	ANALYSIS	USES	HARDENING CHARACTERISTICS		
				HARDENING TEMPERATURES	QUENCH	RC
High Tungsten	CLARITE -T1H-	C .72 W 18.00 Cr 4.00 V 1.15	Lathe Tools Cutters Reamers Drills and Taps Broaches	Range: 2200°F. to 2350°F. For Maximum Cutting Capacity 2350°F. For Hardness and Toughness 2300°F. For Increased Toughness 2200°F. (For Hot Work 2000°F.)	Oil Salt Bath Air	63-65 63-65 60-63
Molybdenum Tungsten	MOLITE -M2H-	C .82 W 6.50 Mo 5.00 Cr 4.15 V 1.90	Lathe Tools Cutters Reamers Drills and Taps Broaches	Range: 2100°F. to 2275°F. For Maximum Cutting Capacity 2275°F. For Hardness and Toughness 2200°F. For Heavy Impact 2100°F.	Oil Salt Bath Air	63-65 63-65 60-63
High Vanadium	VANITE -T2H-	C .82 W 18.50 Cr 4.25 V 2.15 Mo .70	Long Life: Form Tools Lathe Tools Milling Cutters Turning: Chilled Rolls Car Wheels	Range: 2300°F. to 2350°F.	Oil Salt Bath	64-66 64-66
Cobalt	MAXITE -T8H-	C .73 W 14.00 Cr 4.00 V 2.15 Co 4.75	Heavy Duty Turning: Axles Car Wheels Cast Iron	Range: 2325°F. to 2375°F.	Oil Salt Bath	63-65 63-65

TEMPERING: Double tempering is recommended. Temper cutting tools at 1050°F. for maximum secondary hardness. To increase toughness and resistance to heat checking on hot work applications, tempering temperatures up to 1300°F. may be used.

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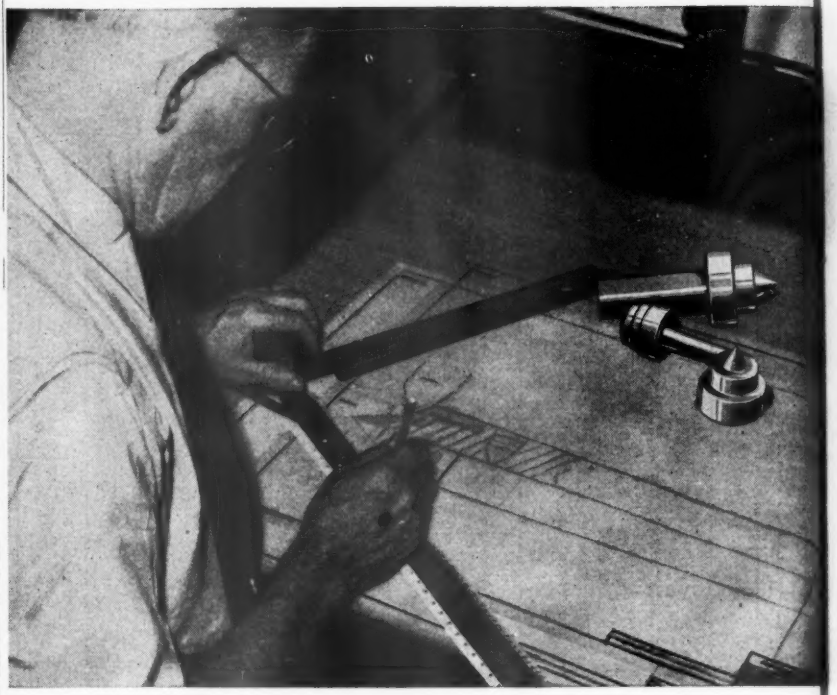

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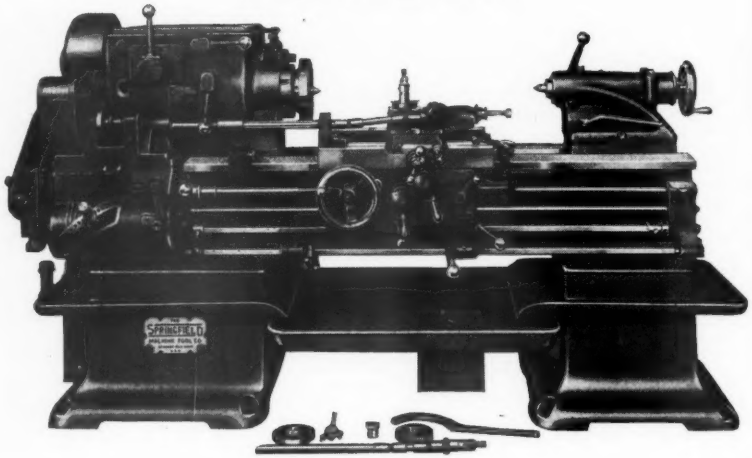

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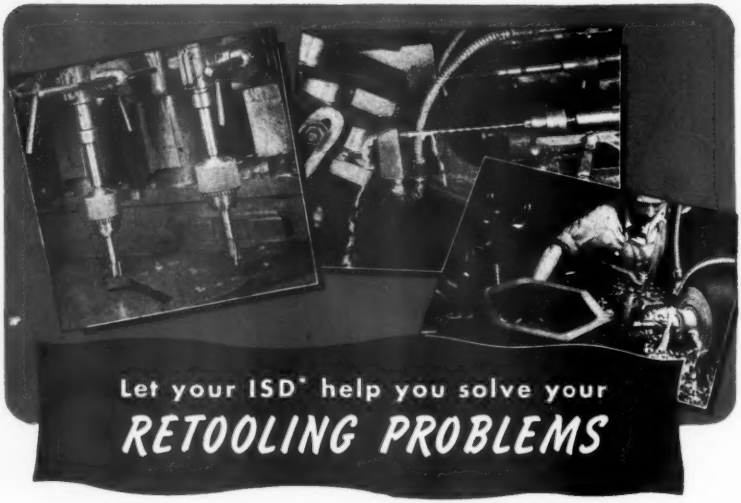
EDITORIAL INDEX

Features

	Page
Deep Drawing Filter Cases, Part I, by Carl J. Nagel	98
Adjustable Tube Marking Fixture, by Alex S. Arnott	104
Jobs & Productivity, by Albert Ramond	109
Selecting the Motor for the Application, Part II, by J. M. Stein and G. A. Caldwell	115

Briefs

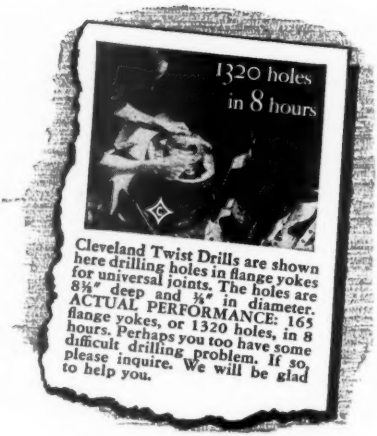
Underslung Trailer	146
Despatch Forging Furnace	148
Induction Heating Work Table	150
American Hole Checker	152
Chrome-Carbide Alloy Thread Gage Surface	154
New Diamond M-26 Milling Machine	156
Hydraulic 20" Slotter	158
Baber-Colman Type D Hobbing Machine	160
Gairing C-13 Counterbore Set	162
Pope Precision Spindle	168
Vertical Drilling, Boring and Facing Machine	170
Liberty New Design Planers	172
H & G Specifier	174
Hammond Belt Grinder	176
Precision Boring Machine	178
Multiple Machining of Aluminum and Magnesium	180
Step Reaming and Threading Thin Walls	182
Crush Form Truing	184
Progress Battery Welder	186
Spot Welding Tweezers	188
Portable Storage Rooms	190
Radial Layout Plate	192
Internal-External Grinders	194
Hydraulic Follower Machine Mills Forming Dies	199
K & H Air-Operated Holding Fixture	201
Kalamazoo Band Saw	203
Synthetic Rubber as Abrasive Wheel Band	205
Bench Surface Grinder	210
Drill Press Spindle Turret	212
Micronoil Metal Protection	214
Tool Steel Tubing	215
5-Tube Precisionaire	216
Hybco Tap Grinder	218
Hand Tapper and Vise	220
Precision Centering Reamer Holder	222



● Beating swords into plowshares may have been a simple job in Biblical times, but changing from war-time to peacetime production today is a complex and troublesome task.

Many manufacturers will need all the help they can get. They will find that now, as always, it pays to telephone their *Industrial **S**upply **D**istributor *first.*

Your *Industrial **S**upply **D**istributor stands ready to help you solve your reconversion problems. He probably carries *in stock* the tools and equipment you will require . . . and if not, he knows how to get them for you promptly.



Cleveland Twist Drills are shown here drilling holes in flange yokes for universal joints. The holes are 8½" deep and ½" in diameter. ACTUAL PERFORMANCE: 165 flange yokes, or 1320 holes, in 8 hours. Perhaps you too have some difficult drilling problem. If so, please inquire. We will be glad to help you.

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Editorial

wartime optical problems

The Ordnance procurement problems faced by the United States during, first, the defense program and, subsequently, our active participation in World War II, were vastly different from those encountered by our armament industries of the first World War. These differences were posed by the newer and stranger weapons, and by the greater varieties of materials and alloys that had to be successfully worked in order to meet rigid military specifications.

Incongruously enough, in the one field of endeavor that differs probably the least in its basic technologies from its status of twenty-five years ago, we have experienced the most disproportionate production troubles and bottlenecks. We refer to such optical instruments of warfare as telescope gunsights and optical range finders, products of the little recognized field of optical engineering.

The principal World War I problem in optical instrument production was the basic material, optical glass itself. With our declaration of war the European sources of supply for optical glass and for optical instruments were cut off abruptly. Starting virtually from scratch both as to know-how and physical plant capacity the estimated production, in pounds of usable optical glass rose from 2850 pounds in April, 1917, to 79,275 pounds in October, 1918.

Since the first World War our optical glass production capacity has been steadily increased so that with the advent of the defense program in 1939-40 we were able to adequately expand existing, successful plants and processes and thus meet current needs. Consequently, we need never again be dependent upon European sources of supply for optical glass.

Our current war production of optical instruments has hinged more upon trained personnel than upon production of the glass itself. Indicative of the seriousness of the lack of trained optical workers was the aid of a group of amateurs in the production of roof prisms as used in telescope sights.

Prior to Pearl Harbor there were not two dozen men in this country who could make these prisms. Army procurement officials admitted the need was desperate. Through the efforts of Albert G. Ingalls of *Scientific American* Magazine the most advanced amateurs in astronomical telescope making effected a working arrangement with the optical department of Frankford Arsenal.

The Arsenal furnished the optical glass and the amateurs accepted the challenge of producing prisms that would pass government inspection. Although this group of 100 most able amateurs produced less than one-tenth of our total military requirements of roof prisms, where they more than made up for this was in quality. The percentage of amateur-produced prisms accepted by government inspectors was higher than for nearly all the industrial producers.

As a consequence of wartime advances in production and inspection methods the post-war applications of optics to metal working should be greatly increased.

In the design of optical instruments the interrelation of mechanical design and optical design has not in the past been given sufficient recognition. Usually the mechanical design has been undertaken by one man or organization and the optical design by another. This has been greatly responsible for the comparative lack of optical instrument development and application in this country.

Our peacetime industry can benefit immeasurably from the wartime lessons learned in, and applications made of, optical engineering which represents one of the oldest of the physical sciences and offers many rewards to those who will explore its proved practicalities.

e w p

Deep Drawing Filter Cases

Part I

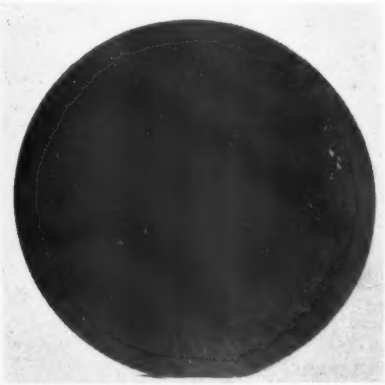
From the presses of the Bellevue Manufacturing Company, Bellevue, Ohio, come the deep drawn cases for the several models of Fram Oil Filters manufactured by the Fram Corporation of Providence, Rhode Island and Ann Arbor, Michigan. Here, by tool design and coordinated photograph is shown, first, the press-working of the case for the Fram Type F4 Filter.

by Carl J. Nagel

The case, or body, of the Fram Oil Filter, Type F4, is made of a plain, pickled and oiled, hot rolled, low carbon drawing steel, .062" thick. The final dimensions of the case, 4⅝" outside diameter and 6¼" deep, result from one blanking and two drawing operations.

The .062" stock for the case is first blanked out to 10⅞" diameter on a Toledo press.

The two subsequent deep drawing operations are performed on Verson "All-Steel" presses, models T30 and T6-30 of 100 to 125 ton capacities. These presses are specifically designed for slow speed, deep drawing operations and were installed by the Bellevue Manufacturing

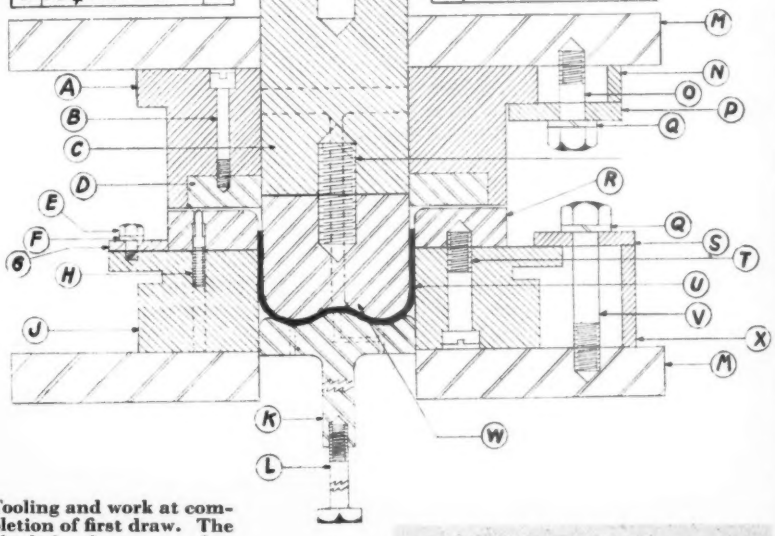


From the above blank, .062" thick and 10⅞" diameter, two drawing operations produce the 4⅝"x6¼" case for the complete filter shown at right.

BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.
A	MACH. STEEL UPPER DIE BLOCK	1
B	STD. $\frac{1}{2}$" CAP SCREW	4
C	MACH. STEEL PUNCH ADAPTER	1
D	TOOL STEEL DIE RING	1
E	STD. HEX. HD. CAP SCREW	2
F	STD. $\frac{1}{2}$" LOCK WASHER	2
G	STEEL DIE STOP	2
H	C.R. STEEL LOCATOR PIN	3
J	MACH. STEEL LOWER DIE BLOCK	1
K	TOOL STEEL BOTTOMING DIE	1
L	STD. $\frac{1}{4}$" MACH. BOLT	1

BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.
M	BOLSTER PLATES	2
N	STEEL CLAMP SUPPORT	4
O	STD. HEX. 1" CAP SCREW	4
P	STEEL CLAMP SUPPORT	4
Q	STD. $\frac{1}{2}$" LOCK WASHER	8
R	TOOL STEEL DIE RING	1
S X	STEEL CLAMP SUPPORT	4 4
T	STD. 1" CAP SCREW	4
U	PICKLED & OILED H.R. DRAWING STOCK	1
V	STD. 1" HEX. HD. CAP SCREW	4
W	TOOL STEEL PUNCH	1

FIGURE 1

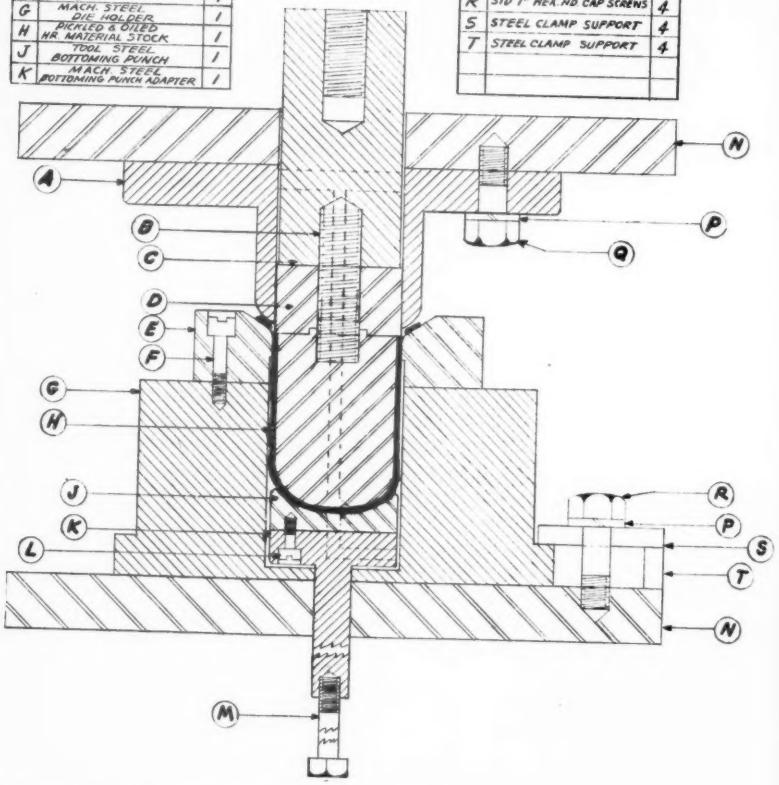


Tooling and work at completion of first draw. The blank has been cupped to 6½" OD and 3½" deep.

BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.
A	TOOL STEEL UPPER DIE	1
B	STD 1½" STEEL STUD	1
C	MACH. STEEL PUNCH ADAPTER	1
D	TOOL STEEL PUNCH	1
E	TOOL STEEL RING DIE	1
F	STD ½" CAP SCREW	4
G	MACH. STEEL DIE HOLDER	1
H	PICKLED & OILED HR. MATERIAL STOCK	1
J	TOOL STEEL BOTTOMING PUNCH	1
K	MACH. STEEL BOTTOMING PUNCH ADAPTER	1

BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.
L	STD ½" CAP SCREW	3
M	STD ⅜" MACH. BOLT	1
N	UPPER & LOWER BOLSTER PLATES	2
P	STD 1" LOCK WASHERS	8
Q	STD 1" HEX. HD. CAP SCREWS	4
R	STD 1" HEX. HD. CAP SCREWS	4
S	STEEL CLAMP SUPPORT	4
T	STEEL CLAMP SUPPORT	4

FIGURE 2



Company for the Fram production because of work cracking trouble initially encountered in attempting the deep draws on higher speed presses. Since the installation of other Verson presses, work rejects have become negligible.

For the drawing and forming operations, the complete tool and die designs are shown in Figures 1, 2 and 3 and the accompanying photographs show the workpieces as they come from the press, coordinated with the tool drawings.

For the first draw, the detailed construction of the upper and lower tools is shown in Figure 1. The 10⅞" diameter blank, coated with a lard oil drawing lubricant, is placed on the hardened and ground tool steel die ring, detail R, Figure 1. It is located by three equi-spaced, spring mounted locator stops, of ¼" diameter, set on the 10⅞" diameter. One of these locators is shown at H, Figure 1.

The tool steel die ring, detail R, is bolted from below to the cast steel die shown as detail J and the whole die ring assembly is clamped to the bolster plate,

Horizontal and vertical views of Fram F4 filter case at completion of second draw. Shown above is the pattern of reinforcing ribs formed by the punch and bottoming die. The forming of these ribs in the second operation draw necessitates the accurate and secure positioning of the punch in relation to the die. By the second draw the work has been brought to 4⅝" OD and 6¼" in depth. The oil line connection holes are subsequently extruded and "lug-riveted" in order to give sufficient metal for threading ¼" pipe thread. The top edge of the case is trimmed by a lathe operation which removes ¼" of metal to bring case to finished size.

detail M, at four points. One such clamping assembly is shown by details Q, S, V and X. To additionally preclude any shifting or misalignment between the tool steel die ring, R, and the cast steel die, J, two die ring stops, G, are provided, one of which is shown by details E, F and G.

The stock as drawn at the completion of the first operation is represented by detail U, Figure 1, and the two photographs, page 99. The 10⅞" diameter blank has been cupped to 6½" OD and 3½" deep over the hardened and ground tool steel punch, detail W. This tool steel punch is combined with a machine steel adaptor punch, the two being fastened together by means of the 1½" stud as indicated by the unlettered arrow immediately above R, Figure 1. The punch assembly is tapered to an included angle of approximately 2° to facilitate removing the work from the punch.

The dotted lines throughout the punch assembly in Figure 1 show the holes provided to permit the escape of entrapped air during the draw. This is a most essential precaution in all deep drawing operations as to both the upper and lower tool members.

The tool steel die ring, detail D, is bolted to the upper die block, detail A, by four equi-spaced cap screws, B. The die ring is used as a stripper and thus eliminates excessive die wear. The upper die block in turn is clamped to the bolster plate as per details N, O, P and Q. The bottoming pad, detail K, also serves as a knockout, and in combination with the die ring, detail D, ejects the work from the punch and die. The ejected work, cupped to 6½" OD and 3½" in depth is fed into a chute and to the second and final operation draw.

The second and final operation in drawing the F4 filter case employs the tooling drawn up in Figure 2. The work, after dipping in a lard oil lubricant is located on the hardened and ground tool steel die ring, detail E, which in turn is bolted to the cast steel die block, detail G. The die ring, E, has a punch lead angle of 30° which blends into a ¼" radius over which the punch draws the material. In this design also the punch is tapered to an included angle of 2° to facilitate stripping the work from the punch.

The punch proper, hardened and

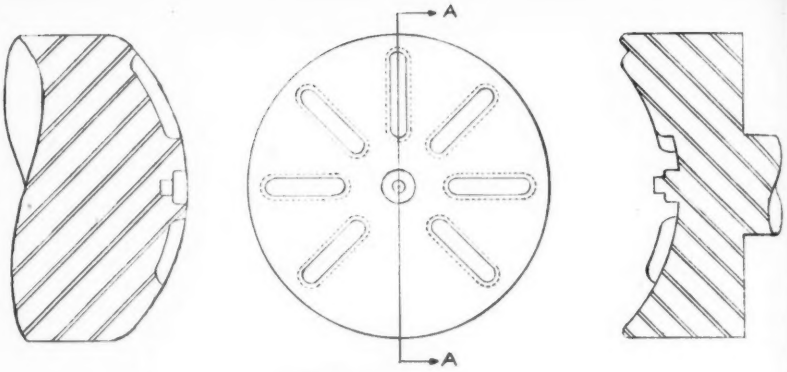


FIGURE 3

ground, is secured by means of a 2" x 6" stud to both the hardened and ground trim punch insert, detail D, and the machine steel punch adaptor, detail C. The trim punch insert, at the bottom of its stroke effects a shearing action at the beginning of the ¼" radius around the die ring, detail E, that trims the excess material from the top of the case. The scrap from trimming can be seen, severed from the stock, between the die ring, detail E, and the upper lead punch, detail A.

In addition to the 2" stud which secures the punch, trim punch insert and the punch adaptor, three cap screw studs are employed to prevent any rotation or change of relationship between the punch and the bottoming punch and pad. These are shown by detail U, Figure 6, and insure exact alignment of the forming element on the end of the punch with those of the bottoming die. The end of the punch is relieved as shown in Figure 3, left, and the relieved areas must register exactly with the corresponding raised forming punches on the bottoming die, shown at the right, Figure 3. This construction of punch and bottoming die acts to form the reinforcing ribs in the base of the filter case at the time of the final draw. The arrangement of the ribs is clearly shown in Figure 3, and ribbed shell is shown by the upper photo, page 101.

The bottom die block, detail G, Figure 2, is made of a standard steel casting machined as shown to enable clamping it to the lower bolster plate, N. The clamping details are indicated by R, P, S and T.

A tool steel die block, detail A, serves as the upper lead punch, and by P and Q is bolted to the upper bolster plate N, of the Verson T6-30 press used on the final draw.

A subsequent finishing operation is that of trimming the drawn case to final size. This is a permanent setup of a standard three jaw chuck on a small lathe. The trimming cut removes approximately ¼" from around the top edge of the shell thus reducing it to its final overall depth of 6¼".

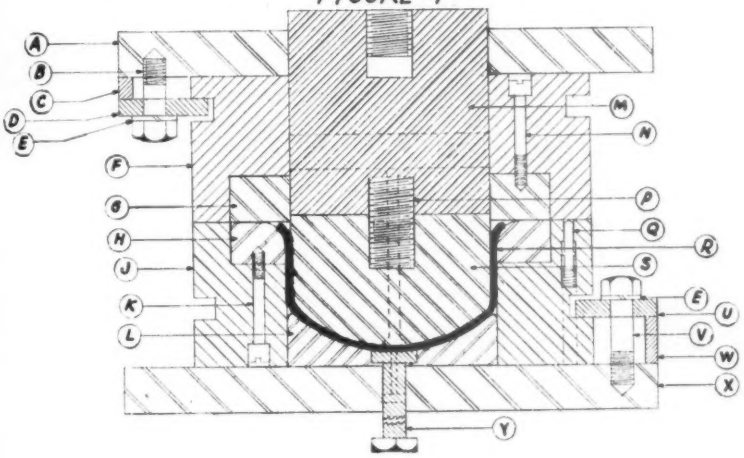
Two bottom and one side oil line connection holes will be noted in the illustrations on page 101. The center bottom hole is extrusion punched on a Ferracute press. The work then goes to a Verson No. 4 Press where two sets of dies perform the job of riveting the center hole extruded metal over a reinforcing lug and extrusion punching the off-center hole. Both operations are completed with one stroke of the press. A third set of dies is put in the Verson for the next operation of riveting a reinforcing lug around the extruded off-center hole.

The hole shown on the side of the filter case, photo, page 101, is extrusion punched on a No. 14 Toledo press and in the next operation, on a No. 8 Bliss press, a reinforcing lug is riveted around this hole as in the instance of the two bottom holes.

BILL OF MATERIALS			BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.	DET.	DESCRIPTION	REQ.
A	UPPER BOLSTER PLATE	1	G	TOOL STEEL DIE RING UPPER	1
B	STD HEX. HD CAP SCREW	4	H	TOOL STEEL DIE RING LOWER	1
C	STEEL CLAMP SUPPORT	4	J	MACH STEEL LOWER DIE BLOCK	1
D	STEEL CLAMP SUPPORT	4	K	STD CAP SCREW	4
E	STD. 1" LOCK WASHER	8	L	TOOL STEEL BOTTOMING PAD	1
F	MACH. STEEL UPPER DIE BLOCK	1	M	MACH STEEL PUNCH ADAPTER	1

BILL OF MATERIALS			BILL OF MATERIALS		
DET.	DESCRIPTION	REQ.	DET.	DESCRIPTION	REQ.
N	STD CAP SCREW	4	V	STD HEX. HD CAP SCREW	4
P	2"x4" STEEL STUD	1	W	STEEL CLAMP SUPPORT	4
Q	C.R. STEEL LOCATOR PIN	3	X	LOWER BOLSTER PLATE	1
R	PICKLED & OILED H.R. MATERIAL STOCK	1	Y	STD. 1" MACH. BOLT	1
S	TOOL STEEL PUNCH	1			
U	STEEL CLAMP SUPPORT	4			

FIGURE 4



In all cases the reinforcing lugs or collars are riveted down by the extruded material in order to surround the hole with a sufficient body of material to permit tapping the holes for a ¼" pipe thread. The reinforcing lugs are blanked out on a Cameron No. 15 Press, from plain, hot rolled, pickled and oiled strip stock, 1⅛" wide and .156" thick.

The Fram F4 filter case cover production involves one blanking, two forming, one extruding, and one assembly operations.

The cover blank, 5½" in diameter, is blanked out of hot rolled, pickled and oiled, strip stock .156" thick. The strips are 12⅞" wide which permits 34 blanks per strip. The blanking is done on a No. 206-C Toledo press.

The first forming operation on the cover is done on a Bliss double geared press. The second forming operation is for the purpose of accurately "setting" the cover to final size and shape and is done on a No. 8 Bliss.

The hole in the cover is extruded on a No. 5 Marshalltown press.

The above tooling for the first operation draw, and the display below of the blank and first, second and third operation draws in the making of the case for the Fram Oil Filter, Type F31, will be detailed in the August Tool & Die Journal.

Adjustable Tube-Marking Fixture

by Alex S. Arnott

In the manufacture of metal tubes, one of which is shown in Figure 1, there arose the problem of making two sets of $\frac{1}{8}$" diameter holes on the flat surface of the tubes. The tubes are made in lengths varying from 6" to 18" and the tolerance on the overall lengths is plus or minus $\frac{1}{32}$". The centers for the holes also vary and these range from 2" to 14" with a tolerance of $\frac{1}{64}$" for all sizes between 2.000" and 6.999" and of $\frac{1}{32}$" for all sizes between 7.000" and 14.000".

The trial and error method of experimenting proved that it would not be practical to punch the tubes because of the limited amount of die space inside the tube. In the experiment, the tubes distorted under the pressure of the punch and the dies split due to the thin die section. The suggestion of providing a complete set of economical drill jigs for each length of tube was considered and was discarded in view of the expense for the small amount of production involved.

As an alternative, it was decided to design a fixture which would make two punch marks on the surface of the tube to the exact centers required, keeping in mind the fact that the centers on the tubes would vary considerably. The two sets of holes then could be drilled in a drill press from these punch marked centers, first with a $\frac{1}{8}$" diameter drill to obtain a dead center, then with the $\frac{5}{16}$" drill to complete the operation.

Marking Fixture

The fixture to perform the marking operation is illustrated in Figure 2, and is designed for two separate operations:

(1) To centralize any length of tube in the fixture so that there would be an equal distance from the center line of the fixture to each end of the tube regardless of the tolerance on the overall length or the tolerance on the centers.

(2) To mark the work by providing two adjustable holder units with tube

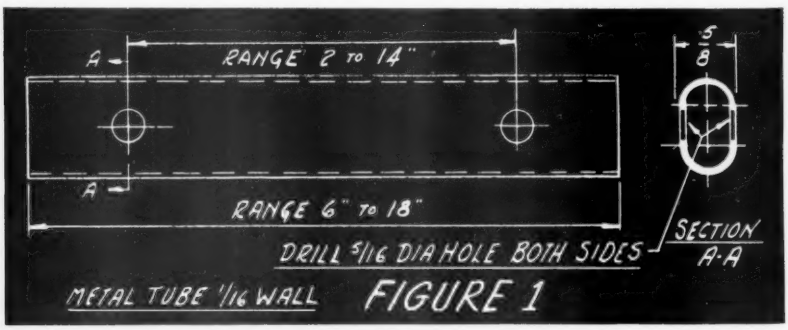


FIGURE 1

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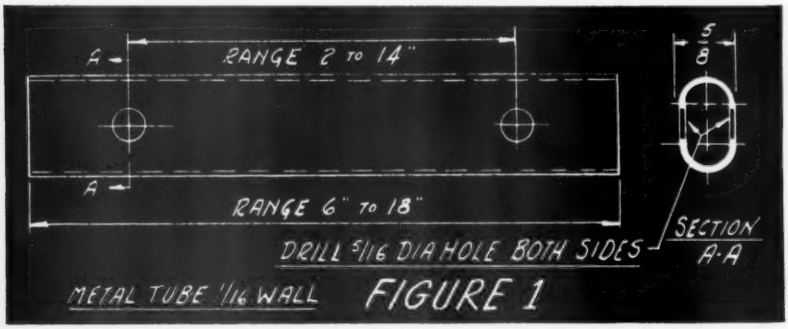


FIGURE 1

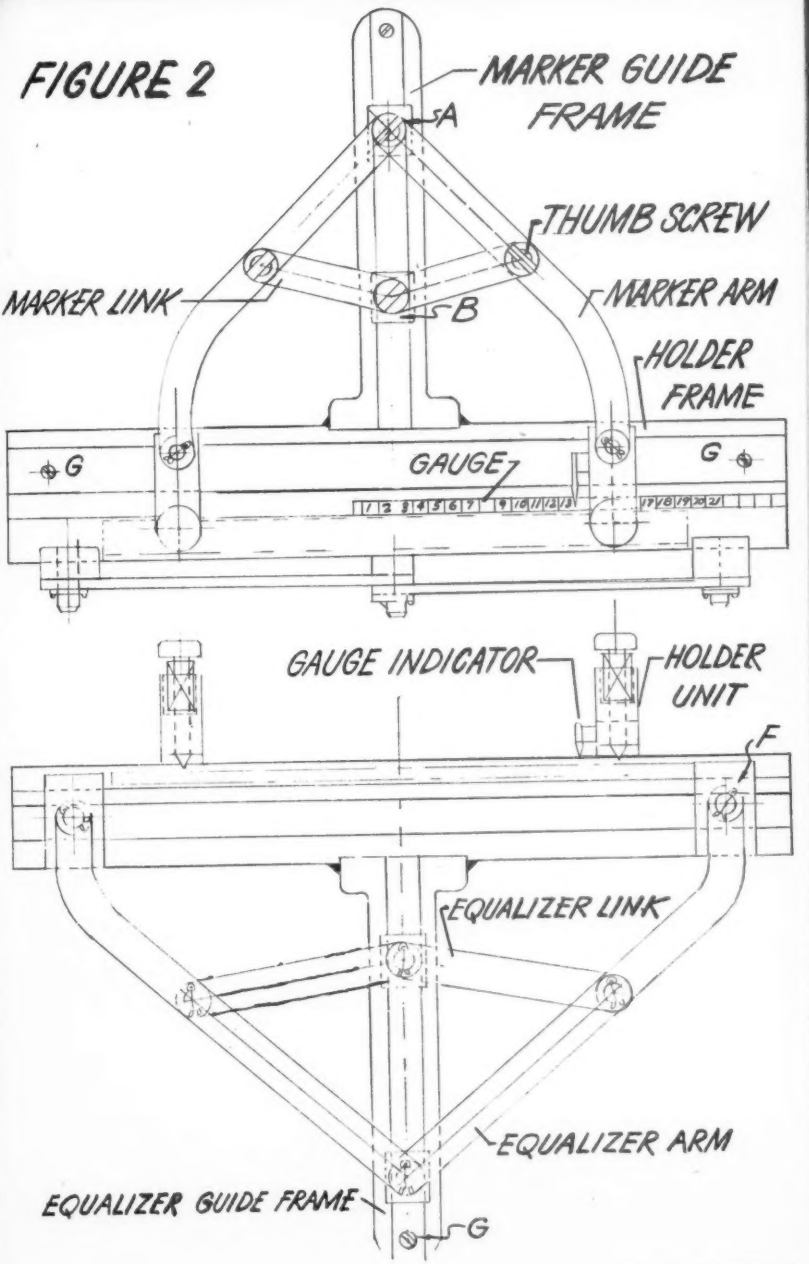
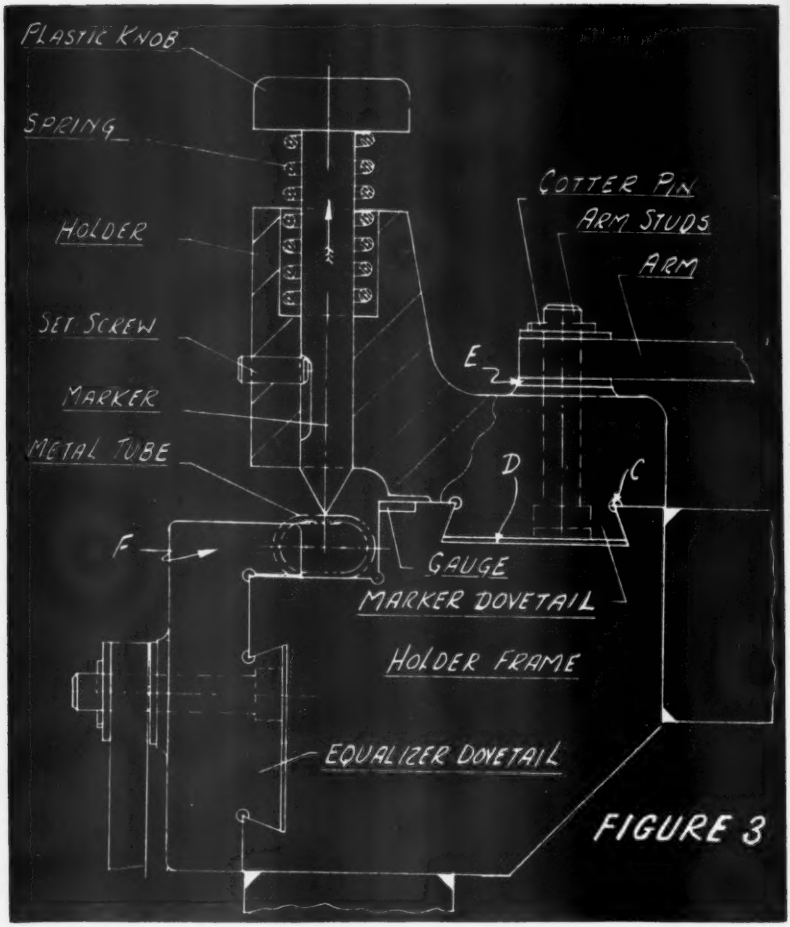


FIGURE 2
MARKER GUIDE FRAME
A
THUMB SCREW
MARKER LINK
B
MARKER ARM
HOLDER FRAME
G
GAUGE
G
GAUGE INDICATOR
HOLDER UNIT
F
EQUALIZER LINK
EQUALIZER ARM
EQUALIZER GUIDE FRAME
G



markers that could be set up with any given centers so that the tubes could be marked at an equal distance from the center line of the fixture to the center line of each punch mark.

The main body of the fixture is made up of three separate units, i.e., the marker guide frame, the holder frame and the equalizer guide frame. The marker guide frame is made from machine steel and has a dovetail guide machined throughout its center line to accommodate the gib sliding blocks (A) and (B). The equalizer guide frame is the same in design and is machined in a similar manner except that it is longer in order to provide for the long arms of the link mechanism. An undercut is made in the holder frame to suit the end of, and to brace, the guide frames. This assures a strong union of the three frames so that the dovetails can be accurately machined in relation to each other without distortion or possible inaccuracy in the link mechanism. The equalizer dovetail is machined at 90° to the marker dovetail to suit the equalizer sliding blocks. A locating surface is machined and ground so that the tubes can be located on a well machined sur-

face and, to complete the holder frame, an undercut is made for a special measuring gage which is fastened to the holder frame with machine screws. This gage is used in obtaining the exact locating centers for the markers and is accurately divided into $\frac{1}{64}$" divisions throughout its length.

Marker Mechanism

The method used to adjust the markers is a link mechanism system which consists of two arms and two links. One end of each arm is fastened to the holder units with a stud and cotter pin as illustrated in Figure 2, and they are free to swing on the arm stud in the holder. The other ends of the arms are joined at a common point on the sliding dovetail block (A) with a wing nut and threaded stud which allows both arms to swing on the stud when the wing nut is loose on the stud. Both arms can be fastened tight to the sliding block and held in a definite position when the wing nut is tightened on the stud. The two links are fastened to the marker arms in the same manner and can be tightened by the wing nut to hold the links in a positive location, both links being fastened to the dovetail sliding block (B).

Marker Holder Units

A detail of the holder units is shown in Figure 3 and these are designed to hold the marker and all the accessories necessary to mark the tubes. The body is made of cast iron and is machined for a gib which is a snug fit for the marker slide. A relief is made at each side of the dovetail as shown at (C) and (D) to reduce the friction between the mating parts. A hole is bored and counterbored in the cast iron holder to suit the stud which connects the marking arm to the unit. The boss (E) on the holder is machined to reduce friction between the arm and the holder, increasing the efficiency of the moving arm.

The marker is made from high grade tool steel and is pointed at one end to punch mark the tubes. A groove in the surface of the marker allows the set screw to protrude beyond the inside of the bore and enter the groove, thus restricting the movement of the marker. The casting is bored to a sliding fit for the marker diameter and is counterbored to accommodate the compression spring which forces the marker in an upward direction when it is not in use, the set screw preventing it from being pushed out of the holder by the force of the spring. A plastic knob is fitted to the end of the marker to complete the assembly.

Equalizer Unit

An equalizer unit is utilized to locate the tubes in the fixture through a link mechanism similar to the adjustable marker mechanism except that all the connections are free to move without restriction of fastenings such as the wing nuts in the marker mechanism. The unit is equipped with two hardened steel locating blocks (F), Figure 2, which are machined to suit the equalizer dovetail shown in Figure 3, and it also has a connecting unit similar to the unit used for the marker arms.

The two sliding blocks (F) are free to move along the dovetail slides in the holder frame, each block being an equal distance from the center line of the fixture because of the operation of the link mechanism. All the connecting joints of the mechanism are free to swing on the studs provided for them and are therefore not restricted in movement in any way.

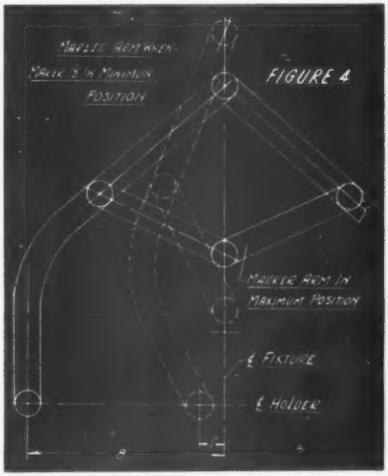


FIGURE 4.

Fixture in Operation

The fixture is mounted on the end of a work bench so that the right angle formed by the two guide frames may be fastened to the bench with wood screws through the four holes (G) in the frame to hold the fixture in a permanent position.

To operate the fixture, the markers must be set up or moved into the correct position to obtain the centers required by the specification. For example: To set up the markers for tubes requiring to be marked with 6.5" centers, the operator takes hold of a marker arm in each hand and moves them toward each other along the dovetail slides until the gage indicator, shown in Figure 2, coincides with a line indicating 6.5" on the gage. This setting may be checked by an inspector and may be doubly checked by observing the reading with the use of a magnifying glass. The link mechanism permits the markers to move equally so that each marker is exactly the same distance from the center line of the fixture. The position of the arms and links when they are in the maximum and the minimum positions is illustrated in Figure 4. As shown, the link slides down and the arm moves up toward the end of the dovetail slide, allowing the opposite end of the arm with the marker fastened to it to move toward the center line of the fixture. Only one-half of the link mechanism is shown in the illustration as the other half is exactly the same in design.

When the markers are set in the correct location, the thumb screws are tightened up to hold the link mechanism firmly in position. This in turn holds the marker units in position throughout the entire operation so they will not move until the wing nuts are loosened.

The operator then inserts the tube on the locating surface as shown in Figure 3 and moves the equalizing arms until the locating blocks (F) make contact with the ends of the tube, thereby centering it in the fixture through the link mechanism. After the tube is properly centered, the operator strikes the plastic knobs of the markers, one at a time, with the palm of the hand to give the marker a sharp blow. The action of this blow depresses the point of the marker which strikes the top surface of the tube to make a punch mark on the tube to the exact centers required. The set screw prevents the point from denting or spoiling the surface of the tube. The compression springs are made for light pressure action and are not strong enough to oppose the blow by the operator and yet there is sufficient strength in the spring to force the marker into its original position after the operation is completed. The equalizer is then moved to the open position so that the finished work can be removed from the fixture. This operation is repeated until all the tubes have been marked with the same centers for the same marker setting.

When tubes with other center dimensions require marking, the markers are moved to a new location and held there while the equalizing operation is repeated.

In practice, approximately 50 tubes per minute could be marked after the fixture was set up and centers checked.

ASA Broadens Scope

Constitution changes in the American Standards Association that will enable it to meet more fully the needs of government and industry in the postwar period have been announced by P. G. Agnew, secretary. The national trade, technical, and governmental groups making up the American Standards Association have ratified these changes, the principal one of which will remove present restrictions limiting the work of ASA "to those fields in which engineering methods apply" so that the organization can handle any future standard or standardization project which is in the field of engineering or consumer goods or in any other field which deserves national recognition.

Another change provides for election to the Board of Directors of three members-at-large. At present all but the ex-officio members of the Board are nominated in rotation by the Member-Bodies. The additional members-at-large will make it possible to enlist the services of outstanding persons from groups not otherwise represented, thus making the board still more broadly representative.

Groups that constitute the membership restated their belief that the central force of the standardization movement should continue to spring from the organized industrial, professional and consumer groups with the full cooperation of the governmental agencies concerned.

Jobs and Productivity*

by Albert Ramond

Business cannot guarantee jobs because business makes products, not jobs. People are not employed just to be put on the payroll, but to produce something for sale—and jobs depend upon sales. No employer can permanently guarantee a given number of jobs unless the market for his product matches his production schedules.

But the postwar problem is to create new markets or enlarge old ones to absorb from 35 to 50 percent more goods and services than were produced or rendered in 1940. Whatever war savings, reduced taxation, increased public works and export trade might temporarily or permanently contribute, the necessary increase in markets must come chiefly from increased purchasing power. Since purchasing power is dependent upon the relationship of incomes and prices, the problem is to have prices sufficiently low and incomes sufficiently high for people to buy a great deal more than they ever did before the war.

The industrial work week which has averaged around 45 hours—with pay for 47.5 during the war—will average around 38 hours and provide little or no overtime after the war. If wartime hourly wage rates prevail, the reduction in incomes will be 20 percent. There will also be transfers from highly paid wartime jobs to lower paid peacetime jobs. As to prices, they have already moved up 30 percent since 1940. This combination of reduced incomes and higher prices is exactly the opposite of what we need.

*Excerpts from a recent talk by Albert Ramond before the Graduate Economic Club, Columbia University.

The Gloomy Versus the Dynamic View

These observations have led a few industrial executives to adopt a rather gloomy view of the future, and to accept a philosophy of leaving things to take care of themselves until wages and prices reach their proper balance. Fortunately, this static attitude has been offset by recent announcements on policy by the National Association of Manufacturers and prominent industrial figures such as Mr. Charles E. Wilson of General Electric. They have endorsed what we might call a dynamic philosophy, expressed in broad terms by the National Association of Manufacturers, and in very specific terms by Mr. Wilson, who said it would be General Electric's postwar policy to sell at the 1940 price levels while paying wages, that is "take home" pay, at the 1944 levels.

How can General Electric accomplish this in the face of rising wartime costs and decreasing postwar incomes? The gap cannot be closed out of profits or out of anticipated tax reductions. Presumably General Electric counts on increased productivity to overcome these handicaps.

For it is to greater productivity that we must look in order to overcome existing higher costs and any possible future cost increases. This increase in labor

MATERIALS WEIGHT TABLES. ***Pages 110, 112 and 114, following, constitute an additional supplement to the tables originally published in TOOL & DIE JOURNAL, May 1944 to December 1944 inclusive, and covering sheet stock calculations. A first supplement appeared in TDJ, June 1945, giving the weight in pounds per inch and per foot for round, square and hexagon bar stock, cold rolled steel. These current and final supplemental tables complete a most valuable reference aid and will be included in the TDJ Materials Weight Tables to appear in book form. For our many readers who have expressed their need for these tables, we hope that these supplemental tables will be looked upon as a "dividend" well worth awaiting. E.W.P. Editor.***

MATERIALS WEIGHT TABLES • SUPPLEMENT • DRILL ROD

Weight in pounds per inch for Number, Fraction and Letter sizes. (Steel, 1 cu. in. = .2836 lb.)

NO.-SIZE	DIA.	LBS. PER INCH
80	.013	.0000357
79	.014	.0000436
78	.015	.0000510
77-1/64	.016	.0000570
76	.018	.0000720
75	.020	.0000890
74	.022	.000108
73	.023	.000118
72	.024	.000128
71	.026	.000151
70	.027	.000163
69	.029	.000188
68	.030	.000201
67-1/32	.031	.000214
66	.032	.000228
65	.033	.000243
64	.035	.000273
63	.036	.000299
62	.037	.000305
61	.038	.000322
60	.039	.000339
59	.040	.000356

NO.-SIZE	DIA.	LBS. PER INCH
58	.041	.000374
57	.042	.000393
56	.045	.000451
3/64	.0468	.000488
55	.050	.000557
54	.055	.000673
53	.058	.000748
1/16	.0625	.000869
52	.063	.000883
51	.066	.000969
50	.069	.00106
49	.072	.00116
48	.075	.00126
47	.077	.00132
5/64	.078	.00136
46	.079	.00139
45	.081	.00146
44	.085	.00161
43	.088	.00173
42	.092	.00189
3/32	.094	.00197
41	.095	.00201

NO.-SIZE	DIA.	LBS. PER INCH
40	.097	.00210
39	.099	.00218
38	.101	.00227
37	.103	.00236
36	.106	.00250
35	.108	.00260
7/64	.109	.00265
34	.110	.00270
33	.112	.00279
32	.115	.00296
31	.120	.00321
1/8	.125	.00348
30	.127	.00359
29	.134	.00400
28	139	.00430
9/64	.141	.00442
27	.143	.00455
26	.146	.00474
25	.148	.00487
24	.151	.00508
23	.153	.00521
22	.155	.00535

productivity will become imperative to all business as soon as what we produce has to be sold in a civilian market. It is an imperative without qualifications; encompassing plants, equipment, materials and, more than anything else, manpower. For while labor may be a small percentage of the total costs and selling prices of a certain segment of industry, the materials used in that industry have been mined, processed, and manufactured by labor somewhere. The buildings, machines and tools have been constructed by labor. So labor productivity and costs are, in one form or another, in both manufacture and distribution, by far the major factor.

We may assume that General Electric has already secured sufficient increases in productivity to carry out its announced postwar policy or else is sure of its ability to accomplish it in the near future. It is also reasonable to assume that Mr. Wilson not only well knew the cost significance of current and pending technological improvements in designs, methods, and new materials, but also felt certain that the General Electric workers would actively cooperate in that necessary program of increased productivity.

Labor's Position on Increased Productivity

This brings us to a consideration of labor's position in a general program of increased productivity for American industry. We like to think that American workers have sufficient intelligence, knowledge and vision to understand that their ability to buy and to own things depends upon their ability and willingness to produce those things—that the more they produce the more they can buy—that unless they produce there won't be anything for them or anyone else to buy. Your own Dean Robert Calkins (of Columbia University) recently showed that in 1943 labor got 33 billion dollars more than in 1940, of which 30 billion accrued because of the enlargement of national output.

But when technological improvements means that 10 men can do the work previously done by 20 or 50, the other 10 or 40 workers will not and cannot be expected to welcome these improvements unless there are other comparable jobs available and unless they have the assurance that they will not suffer. All arguments to the effect that the cost reductions will eventually mean lower prices, enlarged markets, greater production and increased employment have little significance so long as the individuals concerned have to wait six months, a year, or longer to see and feel the completion of that cycle. Mr. Clinton Golden of the C10 made this point very clear at the American Society of Mechanical Engineers meeting in Pittsburgh last summer.

So we have resistance—sometimes open, sometimes passive. When mechanical loaders were first introduced in coal mines and could do with 2 men what 8 or 10 men did previously, there were mysterious, repeated breakdowns so that the expected production and reduction in man-hours per ton did not materialize for a long time. The new faster tire-making machines were not accepted in Akron in 1939 and had to be introduced elsewhere. In other industries labor-saving machinery was frequently used only when the same size crews were maintained for the same production.

Management Can Plan for Steady Employment

Unemployment resulting from widespread economic disturbances is a national problem over which individual employers have little or no control. But the loss of jobs as the result of increased productivity is something which individual employers can often prevent or for which they can provide some compensation. The cost of such protective practices will not be as great as may be anticipated because there will be a much greater effort on the part of management to plan for more steady employment.

If labor is expected to cooperate, as it must to make any program of increased productivity *really* effective, management will have to provide stronger inducements and more positive assurance that labor will not suffer because of that cooperation. It must provide adequate protection when technological improvements, and more *particularly* improved labor performance, reduce the necessary manpower. If there is no way to absorb the excess labor on regular

MATERIALS WEIGHT TABLES • SUPPLEMENT • DRILL ROD

Weight in pounds per inch for Number, Fraction and Letter sizes. (Steel, 1 cu. in. = .2836 lb.)

NO.-SIZE	DIA.	LBS. PER INCH
5/32	.156	.00543
21	.157	.00549
20	.161	.00577
19	.164	.00598
18	.168	.00628
17-11/64	.172	.00658
16	.175	.00681
15	.178	.00705
14	.180	.00721
13	.182	.00737
12	.185	.00761
11-3/16	.188	.00782
10	.191	.00811
9	.194	.00837
8	.197	.00864
7	.199	.00881
6	.201	.00899
13/64	.203	.00917
5	.204	.00926
4	.207	.00953
3	.212	.0100
2-7/32	.219	.0107

NO.-SIZE	DIA.	LBS. PER INCH
I	.227	.0115
A-15/64	.234	.0122
B	.238	.0126
C	.242	.0131
D	.246	.0135
E-1/4	.250	.0139
F	.257	.0147
G	.261	.0152
H-17/64	.266	.0158
I	.272	.0165
J	.277	.0171
K-9/32	.281	.0176
L	.290	.0187
M	.295	.0194
19/64	.297	.0197
N	.302	.0203
5/16	.312	.0218
O	.316	.0223
P	.323	.0232
21/64	.328	.0240
Q	.332	.0246
R	.339	.0256

NO.-SIZE	DIA.	LBS. PER INCH
11/32	.344	.0263
S	.348	.0270
T	.358	.0285
23/64	.359	.0287
U	.368	.0302
3/8	.375	.0313
V	.377	.0317
W	.386	.0332
25/64	.391	.0340
X	.397	.0351
Y	.404	.0363
13/32	.406	.0367
Z	.413	.0380
27/64	.421	.0395
7/16	.437	.0426
29/64	.453	.0457
15/32	.469	.0489
31/64	.484	.0521
1/2	.500	.0556
33/64	.515	.0590
17/32	.531	.0628
35/64	.546	.0661

productive jobs, special jobs should be provided, even though they may not be of immediate productive value, or other jobs must be found elsewhere. And if that is not possible, then some form of substantial dismissal wage or bonus will have to be paid while unemployment lasts. Perhaps such plans can be worked on an industry-wide basis, that is, by all manufacturers in a given industry agreeing to the same plan. If leading firms in any industry adopt the policy, under present labor conditions others will have to do likewise.

Unemployment because of seasonal variations must also be better taken care of than in the past. These fluctuations may be unavoidable in the case of perishable crops or products which are dependent on irregular, unpredictable factors. But in the manufacture of most industrial products it may well be found that the real costs of a system which produces only that which it immediately sells are greater than the cost of equalizing and storing production. Furthermore, unless continuity of employment is improved, we may expect that the demands for annual wages and other forms of guaranteed income will be intensified and that the ultimate cost therefrom will exceed that of the possible preventive measures.

Plenty of Opportunity to Increase Productivity

During the war the possibilities for increased productivity have been repeatedly illustrated. In the production of articles of war there have been enormous man-hour reductions which only a few months before seemed altogether impossible. It may be argued that our relative inexperience in war manufacture would naturally lead to spectacular improvements as we become more familiar with war manufacture, and that this would not be the case with civilian production to which our managers and technicians have already given many years of their best thought. Factual records and observations, however, lead to the conclusion that possibilities for increasing productivity do exist and furthermore that they can be realized.

The WPB has reported that substitution of incentive wages for hourly pay in several hundred war plants gave an average increase in production of 40%. In our own experience, the result of improved management and production control methods was a 23% increase in productivity, without incentives, and 70% with incentives. The average additional wage due to incentive pay was 28%, the cost reduction 27.6%. This was for 1943 and involved over 100 plants. If such results could be accomplished in wartime when there was already the strongest of urges for everyone to do his best, we certainly should expect at least as much in postwar times. Furthermore, a great many new techniques developed in connection with war production will be available for civilian production. We will have new and modernized plants with the best tools and equipment. We will have a larger and better-trained working population. We will have more experienced management and better engineers.

Recently attention has been called to the fact that the "service" industries, such as trade, transportation, communications, and public and professional services, employ as many people, if not more, than manufacturing. It should be made clear that the need for higher productivity also applies to the service industries. Through greater efficiency and decreased costs the service industries can be of substantial help in building a large postwar market to achieve high level employment.

Summary

The postwar employment problem essentially involves our ability to make productive use of all of our resources—plants, equipment, material and manpower. Since the human element is so deeply involved in all of this, the solutions provided by management must be based on the most serious consideration of the human element, thereby insuring the necessary cooperation of all concerned. The record of American managers, engineers and workers during the war leads us to believe that this problem can be successfully solved without going through the painful transitional period which many assume is inevitable. It is my belief and hope that this view of the situation will be actively and effectively supported in the educational field, which is contributing so much to our current and future thinking.

MATERIALS WEIGHT TABLES • SUPPLEMENT • DRILL ROD

Weight in pounds per inch for Number, Fraction and Letter sizes. (Steel, 1 cu. in. = .2836 lb.)

NO.-SIZE	DIA.	LBS. PER INCH
9/16	.562	.0704
37/64	.578	.0743
19/32	.594	.0784
39/64	.609	.0825
5/8	.625	.0869
41/64	.640	.0911
21/32	.656	.0958
43/64	.671	.101
11/16	.687	.106
45/64	.703	.110
23/32	.719	.116
47/64	.734	.120
3/4	.750	.126
49/64	.765	.131
25/32	.781	.136
51/64	.796	.141
13/16	.812	.147
53/64	.828	.153
27/32	.844	.159
55/64	.859	.165
7/8	.875	.171
57/64	.890	.177

NO.-SIZE	DIA.	LBS. PER INCH
29/32	.906	.183
59/64	.921	.189
15/16	.937	.196
61/64	.953	.202
31/32	.969	.209
63/64	.984	.216
1	1.000	.223
1 1/64	1.015	.230
1 1/32	1.031	.237
1 3/64	1.046	.244
1 1/16	1.063	.252
1 5/64	1.078	.259
1 3/32	1.093	.266
1 7/64	1.109	.274
1 1/8	1.125	.282
1 9/64	1.141	.290
1 5/32	1.156	.298
1 11/64	1.172	.306
1 3/16	1.188	.314
1 13/64	1.203	.322
1 7/32	1.219	.331
1 15/64	1.234	.339

NO.-SIZE	DIA.	LBS. PER INCH
1 1/4	1.250	.348
1 17/64	1.266	.357
1 9/32	1.281	.365
1 19/64	1.297	.374
1 5/16	1.313	.384
1 21/64	1.328	.393
1 11/32	1.344	.402
1 23/64	1.359	.412
1 3/8	1.375	.421
1 25/64	1.391	.431
1 13/32	1.406	.440
1 27/64	1.422	.450
1 7/16	1.438	.460
1 29/64	1.453	.470
1 15/32	1.469	.480
1 31/64	1.484	.490
1 1/2	1.500	.501

Selecting The Motor For The Application - Part II

The use of A-C commutator motors is somewhat limited because of poor commutation but on single phase supply lines the repulsion type of motor is often used for accelerating high inertia loads. With this type of motor as with D-C motors the heating in the rotor is small on acceleration and presents similar characteristics to a variable frequency system. These losses are illustrated in Figure 9.

by J. M. Stein
MOTOR ENGINEERING DEPARTMENT
and G. A. Caldwell
INDUSTRY ENGINEERING COMPANY
Westinghouse Electric Corporation
East Pittsburgh, Pennsylvania

With this background on the fundamental characteristics of squirrel cage induction motors, let us turn our attention to some definite applications.

For the largest group of applications as represented by fans, pumps, compressors, conveyors, etc., which are started and stopped infrequently and have low inertia loads so that the motor can accelerate in a few seconds, the conventional general purpose motor can be used. If the motor is installed at a location where there is limitation on the starting current the Class 1 motor can be used, or if the current is still in excess of what can be permitted then reduced voltage starting is employed. On those applications where reduced voltage starting does not give sufficient torque to start the load with either general purpose or Class 1 motors, the Class 2 motor with its high inherent torque along with reduced starting current supplied in combination with reduced voltage starting will solve the problem.

On those applications such as some conveyors and compressors sometimes requiring starting torques of at least twice full load motor torque, the Class 2 motor must be used with full voltage starting.

One type of drive in this general classification which sometimes requires special consideration is the drive for large fans. These drives, once they are accelerated, run continuously at full load, and therefore it is desirable to have the best possible efficiency and power factor. However, some of the fans have extremely high values of WR^2, and motors with normal starting torque characteristics may require from 30 seconds to 1 minute to accelerate. With starting current flowing in both the rotor and stator for this long period of time it may generate sufficient heat to damage either winding in the form of a charred insulation on the primaries. What is more probable, the rotor winding will get so hot that the bars and rings will warp and bend and eventually crack and break. To meet this application with a squirrel cage motor a special Class 1 motor is used to reduce the starting current to a minimum and then the rotor of the motor is designed with a large mass of material, especially in the end rings so that it is possible for the motor rotor to absorb the tremendous losses during the accelerating period without reaching excessive temperatures. Once the motor reaches its full load speed the losses return to normal and the rotor rapidly cools down to its normal operating temperature.

Another continuous running motor application which requires special consideration is on drives where there is high

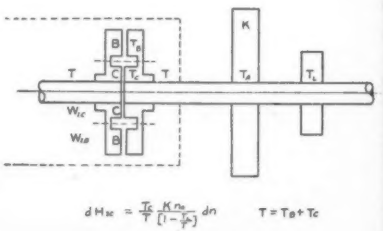


FIG. 8

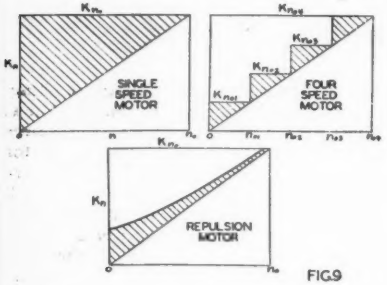


FIG.9

external inertia quite often in the form of a flywheel and where the load instead of being of a continuous full load torque is pulsating in nature. Typical examples of this type of application are presses and bolt headers. In this type of application no work is being done for the majority of time and then a peak load occurs which may require torques many times the full load torque of the motor. Under these conditions the running efficiency of the motor at full load is not important because it never operates at that point, and therefore the motor is deliberately designed with more than normal secondary resistance so that it has a tendency to slow down as the load comes on the drive. This tendency for the motor to slow down permits the flywheel to give up energy to absorb the peak load with the motor exerting no more than full load torque. However, the energy that is taken out of the flywheel during the work stroke must be returned to it by the motor, and therefore the motor must have sufficient torque to accelerate the flywheel before the next work stroke is made. Since presses work at widely varying rates, say from 2 or 3 work strokes per minute to as high as 100 to 150 work strokes per minute, the correct amount of rotor resistance will vary depending upon the number of strokes per minute made. On the extremely large presses making only a few strokes per minute there is ample time for the flywheel to slow down 10 to 15% during the work stroke and give up a considerable part of its kinetic energy. Therefore, motors used on this type of press should have high slip, and one of the standard ratings listed by the motor manufacturers is a motor having 8 to 13% slip, and is the correct motor to use.

As the number of strokes per minute increases, the length of time of the working stroke decreases, and there is not much time available for the flywheel to slow down, nor is there much time for the motor to reaccelerate the flywheel between strokes, so that the amount of slow-down of the flywheel is usually between 5 and 10%, and the standard line of press motors with 5 to 8% slip has been designed for this application. These presses usually make in the neighborhood of 10 to 40 strokes per minute.

On the smaller presses making 100 to 150 strokes per minute there is very little time for the flywheel to accelerate or decelerate, and the standard motor which has approximately 3% slip is entirely adequate for the application and there is no object in supplying the high slip motor. Quite often someone tries to use Class 2 motors on these high torque applications, and if they do not have trouble due to overheating, trouble may develop in the form of mechanical failure of the rotor due to the unequal heating in the double deck winding as previously explained.

These special applications just described are fairly simple so far as applying the proper motor is concerned, and rather accurate calculations can be made to determine the motor heating and thus apply the proper motor. However, there is another group of applications which involves frequent starting and stopping or reversing which may or may not involve variable running loads and even periods when the motor is at rest. These applications are much more difficult to calculate and also it is usually hard to get a set of fixed operating conditions. Typical applications of this type include small hoists, skip hoists, reversing turret lathes, drilling and tapping machines, and centrifugals of various kinds. Usually applications of this type have external WR²'s that are roughly comparable to the WR² of the motor rotor itself, and in fact in most cases every attempt is made by the machinery builder to reduce the inertia of the revolving parts, since it is obvious that the heating of the motor is directly proportional to the inertia of the drive. Some applications require 40 to 50 re-

versals per minute and 15 to 10 reversals per minute are common.

No attempt will be made here to set up methods for calculating the losses on a given duty cycle but merely to point out some of the factors that determine the design of the proper motor for the application. In the first place the losses in the motor for a drive of this type can be divided into two parts—the losses during changes in speed and the running losses. Unfortunately, an increase in rotor resistance which tends to reduce the motor losses for changes in speed, tends to increase the losses while running at constant speed. If the size of the motor has been determined by the torque required to give rapid acceleration and deceleration and has a very light running load, then the running losses can be largely ignored. If on the other hand the motor must carry full load torque after it has accelerated to full speed, then it is important to keep the slip to a minimum amount.

As previously mentioned, it is also important to keep both the WR^2 of the motor and the load to a minimum. After the machinery builder has designed his machine to reduce this value to a minimum, then it is up to the motor manufacturer to proportion the rotor to keep the motor WR^2 to a minimum. Even though squirrel cage motors are compact in design and small for the HP rating delivered, the inertia of the rotor can often be reduced as much as 50% by changing the ratio of rotor diameter and length from what is used on general purpose motors.

It is only by careful consideration of these factors that the ideal application for some of the more complicated duty cycles is obtained. For instance, let us consider the problem of the proper motor for a small hoist. For quite a number of years small hoists were used almost exclusively for a very intermittent type of service perhaps being used a few times an hour or even a few times a day with the motor being energized for only a few minutes. Therefore, it became common practice to give these motors an intermittent rating of either ¼ or ½ hour and design the motors with high resistance rotors and with the primary of the winding saturated so as to obtain the maximum amount of torque from the smallest frame size of the motor, and efficiency power factor and heating were not considered. The use of small hoists has rapidly expanded, and they are now often used in applications such as production assembly lines where they are used on a given duty cycle for 24 hours a day. Under such conditions the efficiency of the motor on a given duty cycle must be seriously considered and the motor designed to reduce the losses and avoid overheating.

In the first place, more iron and copper must be used for a given HP and torque rating to reduce the running losses. This may result in an increase in frame size. The slip of the motor is decreased so as to more equally balance the running and accelerating losses. Recently a small hoist manufacturer tested two motors on an identical duty cycle, the only difference between the two motors being that one had a rotor resistance giving 5% slip at full load and the other giving 10% slip at full load. The motor carried approximately full load current for 20 seconds during hoisting, approximately ⅓ load for 20 seconds during lowering, and was making approximately one complete cycle each minute. Due to the comparatively long running time it was found that the running losses were considerably in excess of the starting and stopping losses with the 10% slip motor and that these losses were much more nearly balanced with the 5% slip motor. On this duty cycle after 4 hours the 10% slip motor had a temperature rise of 95° while the 5% slip motor had a temperature rise of 58°. It is obvious which is the correct motor for this application, although if this same hoist was used on an application of a very intermittent nature the 10% slip motor would be used and would have the advantage of having slightly less starting current than the 5% slip motor.

Quite often it is only by running tests on the actual machine that the best balance of these various factors can be determined, and this procedure is often followed. While this expense and trouble is not justified for a single application, it is very desirable to do so in case a special motor is being designed for a machine that is going to be produced in quantities. Drilling and tapping machines, turret lathes, extractors, washers, etc., are all examples of where this procedure is quite often followed.

Although we have definitely avoided discussing various mechanical modifications that are often required on squirrel cage motors, it is desirable to consider the ventilation of the motors and the type of insulation used. We all know that it is quite often desirable to build the motor into the machine or to make the motor totally enclosed to protect it from cast-iron dust, oil fumes or other dirt in the atmosphere surrounding the motor. These enclosures restrict the ventilation of the motor and reduce the amount of heat that can be dissipated by the motor. Even with the motor ideally designed for the application, the losses on duty cycle operation are usually higher than for a motor operating continuously at a constant load. The amount of losses that can be dissipated by a motor with a given temperature rise is usually roughly proportional to the radiating surface of the motor when it is totally enclosed or in proportion to the amount of air circulated through it when of the open type.

When it is satisfactory to supply an open motor, the temperature rise of the motor can be kept down by supplying a more elaborate blower mechanism on the rotor than normally supplied which tends to circulate a much larger volume of air and thus keep down the temperature. However, care must be exercised that this additional rotor does not materially increase the WR^2 of the unit. Of course, you can always increase the size of the motor and therefore dissipate more losses, but this is undesirable from a space standpoint and also the size must be increased in such a manner that the rotor WR^2 is not increased to gain much advantage.

On many severe duty cycle jobs we find that even with the best possible electrical design the losses are sufficient to cause temperature rises in the motor higher than can be withstood by normal Class A insulation, and in these cases the answer is high temperature insulation. For many years Class B insulation has been recognized as a standard type of insulation for motors, and it permits the motor to operate at a 75° rise instead of a 40 to 55° rise. Class B insulation makes use of the best insulating materials that are available, such as asbestos, mica, and glass. However, it is used only where necessary due to a considerable increase in cost of the motor so equipped.

A new type of insulating material has been recently developed in the form of silicon resins, and when these materials are used to impregnate motors insulated with glass and mica materials, temperature rises of as much as 150° C or even higher can be tolerated without damage to the motor winding. While it can be said that the use of this type of material is still in an experimental stage, a great deal of work has been done and we have installed several motors with this type of insulation. We have deliberately picked spots where we could replace a motor that was frequently burning out either due to excessive loads, high ambient temperatures, or mounted in a place where no ventilation is obtained.

High temperature insulation promises to be the solution of many applications, but we must be careful to remember that high temperature insulation is the solution to the problem only when heating is the limitation of the machine design. On standard open motors running under normal operating conditions some other factor is quite often the limitation. For instance, motors must be designed to have certain torques, both starting and pull-out, power factor, and efficiency. We know that our standard open motors meet these requirements, and the temperature rise is often less than 40°. It is true that it is possible to redesign the motors and obtain the HP rating on a smaller frame size and still get good values on efficiency, but quite often the starting and pull-out torque is reduced or else the power factor is reduced. However, on the special applications mentioned above where we can obtain the necessary electrical characteristics as far as torque and efficiency are concerned in a given frame size, but our motor will overheat due to the duty cycle, then the high temperature insulation has a definite place in the picture.

A disadvantage of the high temperature insulation besides its greater cost is that the high temperature of the motor itself transmits heat to other parts of the machine and may cause distortion and inaccuracy in the work being done. This is especially true on machine tools doing precision work.

Simple Static Test for Rubber Belting

An easy method to determine whether any rubber V-belt, flat belt, hose or other product is static conductive has been developed by technicians of The B. F. Goodrich Company, which was among the first to develop rubber compounds which conduct static.

The company recommends that all static conductive rubber belts be tested for conductivity at regular intervals of at least once monthly.

Static conductive rubber belts have proved especially valuable in many phases of war work, particularly in operations where a static spark might set off a fire or explosion. They also will have many other peacetime uses, including belts for washing machines and other household appliances.

A simple assembly, using a five or six foot length of lamp cord with standard rubber socket plug, a two-watt Neon bulb, two ordinary clamps or metal prongs and two insulated handles can be readily constructed for the tests.

One of the wires of the cord is cut, the Neon bulb inserted in a standard base, the insulated handles installed near the end of each wire and the prongs or clamps attached to the wires.

To make the test, part of the belt or other rubber product is moistened with water, leaving a dry section eight to twelve inches long between the moistened surfaces, the testing assembly is plugged into any 110 volt alternating current line, and the clamps or prongs applied to the moistened surfaces, with the dry in the middle.

If the bulb glows, the rubber product is a static conductor.

The belt or other article under test must be suspended in the air between the clamping points, or rest on a table or other surface which has been insulated so it is non-conducting.

A device for drawing lines parallel to a splined line has been devised by Charles A. Jackson of Ferguson, Missouri. A pencil point is inserted in the center hole of a plexiglas or aluminum disk which is then propelled along the edge of a spline or French curve. The set of graduated disks takes care of ordinary requirements in splining. Ordinarily it takes five minutes or more to rearrange the spline and weights for each line but with the new Jackson instrument there is no lost motion and a multiplicity of lines parallel to the initial splined line can be drawn quickly and accurately.

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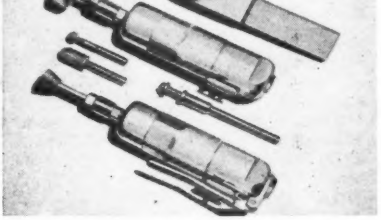
PROGRESS ON PARADE

THE NEW ROTARY FILE AND DIE GRINDER, designed and manufactured by Forss Pneumatic Tool Co., has high speed and power, and is small and light weight; making it especially useful as a tool post grinder for internal grinding, for finish die grinding and similar applications. As a

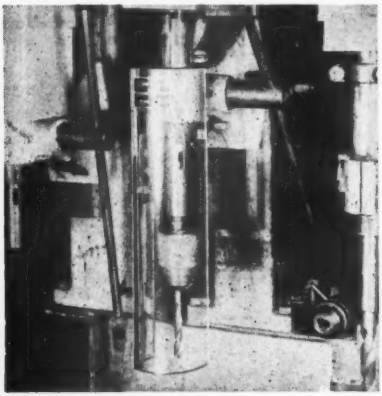


rotary file it is particularly suitable for cleaning aluminum castings and for metal pattern work. The design of the Forss Grinder includes the following 11 noteworthy features: minimum exhaust noise through a triple series of expansions and contractions; a safety lock for the trigger in both running and off positions; flexible sleeve collet; extra large spindle bearing; extra heavy spindle; integral cooling system for bearings and case; built-in lubrication system; a self-seating poppet valve throttle; wide and comfortable trigger; rotor end plates integral with the rotor; and an air exhaust forward around the spindle. This Forss pneumatic tool has a speed of 25,000 rpm. It is 6½" long; 1½" in diameter; weighs 1 lb; has an elastic wheel capacity of 1½" and a vitrified wheel capacity of 1". Standard equipment is a collet chuck and extra equipment includes a flexible sleeve collet, a wheel arbor, tool post clamp and extension spindles. Full particulars may be obtained from FORSS PNEUMATIC TOOL CO., Dept. TJ, Rockford, Ill.
INFORM-A-GRAM KEY No. 868-A

AN INSIDE MICROMETER GAGE that makes practicable direct visible readings in a scale graduated in "tenths" (0.001") has been developed by engineers of U. S. A-C-E TOOL GAGE COMPANY. With this micrometer-caliper device it is possible quickly and accurately to measure the width of grooves $\frac{1}{32}$" deep and over and the depth of counterbores and grooves inside a bored hole and to read the dimensions in the gage stem which is always in sight of the operator. When the locknut is set it remains in position even after rough handling. The instrument has the calipering range of five telescope gages and two small hole gages. The Type A Gage makes possible readings graduated in "tenths" from .400" to 1.500" with a total caliper range from .250" to 3.1875". This range may be increased by the use of extension points. Attachable ball points that add .500" to the caliper range and assist in calipering deep grooves or counterbores are available; also movable inside thread caliper points that can be checked against outside micrometer calipers for depth or pitch diameter if inside screw threads and which give ranges in .001" from ¾" to 1¾" or 1¾" to 3½". Thread caliper points are ground for pitch of U.S. or Whitworth Standard and threads, and are useful for quick fitting when cutting inside screw threads or measuring small grooves or recesses. For information and prices write: U. S. A-C-E Tool Gage Company, Dept. T, 827 S. Hoover St., Los Angeles 5, Calif., or use
INFORM-A-GRAM KEY No. E1-A

PROGRESS ON PARADE

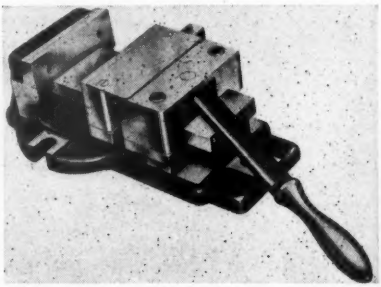
TRANSPARENT SAFETY GUARDS. Injury to machine operators caused by flying chips, hot sparks, splashing oil, puffs of machining dust, etc., can now be held to a minimum by the use of "Kleervu" Safety Guards, a product of the WRIGHT-AUSTIN CO., 350 West Woodbridge St., Dept. TJ, Detroit 26, Mich. These guards prevent such sparks, metallic particles, splashing liquids from coming into the open by means of an "invisible", chip-proof barrier; yet they provide unobstructed visibility. Kleervu guards are made of a heavy-gauge



plastic, clear as window glass but of great toughness and high resiliency. Although its properties enable it to be sawed or drilled as easily as wood, it can be molded into practically any shape or contour. Kleervu guards are available in a number of standard sizes, but can be readily supplied in size or shape to fit any machine. A descriptive bulletin will be sent on request.
INFORM-A-GRAM KEY No. D79-A

SPOT WELDERS. A feature of the two new bench type Universal Midget Automatic Spot Welders now available from the INTERSTATE MACHINERY CO., INC., 1431 W. Pershing Rd., Chicago 9, Ill. is a built-in automatic weld timer or a separate timer panel for stitch welding; automatic repeat pulsation welding or synchronous one cycle timer. These welders, specifically designed for the precision welding of light metals, are equipped with water-cooled transformer, electrodes and tips. They are air operated and controlled by foot switch, solenoid valve and pressure switch. Write for Bulletin TJ and prices.
INFORM-A-GRAM KEY No. C42-A

WEDGE-LOCK PRODUCTION VISE. A new fast operating production vise operating on the wedge-lock principle has been announced by Universal Engineering Co. which reduces work change time on milling machine and drill press work from 10% to 80%. A short 15° pull on the locking lever clamps work in the vise, and a second pull of only 7° firmly locks the piece, ready for production. Pres-

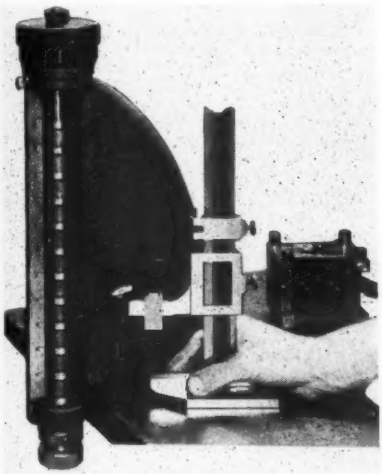


sure is applied to the adjustable jaw through taper locking wedges made of hardened and ground steel. Interlocking teeth on the bottom of the slide and gib keep the adjustable jaw positively in place, even under heavy cuts and vibration. In production work, the operator can load with one hand and manipulate the vise with the other. The vise can be adjusted to lock pieces of varying size by simply loosening two screws. The splined roller contact of sliding jaw permits exact adjustment for any size piece. Triple-locking contacts keep the jaws absolutely parallel, thereby evenly distributing applied force to eliminate possible displacement or loosening of jaws. This vise is made with 4", 5" and 6" jaw widths. Send your request for complete information to UNIVERSAL ENGINEERING CO., Dept. TD, Frankenmuth, Mich.
INFORM-A-GRAM KEY No. 276-A

NEW BLAST NOZZLE. A complete line of nozzles using Norbide Boron Carbide inserts has recently been added to the American Foundry Equipment Co.'s present line of Long-Lyfe Blast Nozzles. The insert is housed in an abrasion-resistant alloy steel jacket, thus assuring long service life. This nozzle is guaranteed for 1500 hours of service when used with steel shot or grit and for 750 hours when used with silica sand. Other advantages claimed by the manufacturer are improved blasting efficiency, decreased air consumption and low hourly costs. Additional information on the new Long-Lyfe Blast Nozzle will be sent by AMERICAN FOUNDRY EQUIPMENT CO., 555 S. Byrkit St., Dept. T-6, Mishawaka, Ind.
INFORM-A-GRAM KEY No. 730-A

PROGRESS ON PARADE

A MASTER SETTING GAGE, under the trade name of "Pla-Chek" has been developed by CADILLAC GAGE COMPANY, Dept. T, 20316 Hoover Road, Detroit 5, Mich. Pla-Chek is made from a hardened steel bar with 12 steps spaced exactly 1" apart with a micrometer screw thread on the lower end, a large micrometer thimble graduated in .0001" on the upper end of the bar, and a simple



triangular-shaped support bracket which rests on the surface plate. To complete the set of instruments, a height gage is utilized, equipped with an indicator gage.

When checking work on the surface plate, the micrometer thimble of the Pla-Chek Gage is set at zero. This brings the lower end of the bar to the exact level of the surface plate.

The dimension of the workpiece to be checked is set on the Pla-Chek by means of the micrometer head. From the illustration it will be noted the gage is set at 3" plus the micrometer reading. The height gage is adjusted to pick off this dimension by bringing the point of the indicator gage to the top surface of the 3" step. The height gage is then passed to the workpiece for checking.

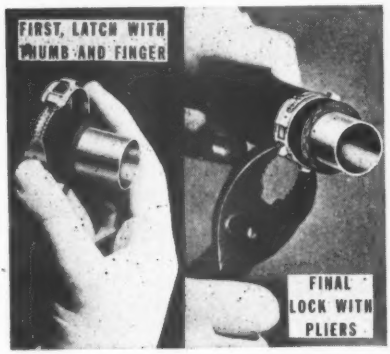
Accuracy is held to .00005" for any size work from .001" to 12" from the surface plate. Inspection work on surface plates is materially speeded up and accuracy maintained by use of the Pla-Chek method.

INFORM-A-GRAM KEY No. B61-A

A NEW MOTOR DRIVEN WORK HEAD, built for use on any make tool grinder, large or small, has been designed by the K. O. LEE CO., Dept. TD, Aberdeen, S. D. Constructed with a No. 11 B & S tapered spindle mounted on ball bearings, hardened and ground, the work head is designed to receive chucks, collet fixtures, face plates, centers, etc. The built-in Universal Motor is easily and quickly mounted and held in position by two T-slot bolts at any convenient spot; and is provided with a reversing switch, conveniently located, regardless of the position of the work table or rotation of the work. The swivel base, which is graduated to 45° either side of center, permits the work head to swivel full 360° if desired. Swivel base can be easily removed from head permitting unit to be mounted on table without base if desired. The unit measures 7" in width, 6½" in length and 7¾" in height and weighs 20½ lbs. Bulletin No. 36WH will be sent by the K. O. Lee Co.

INFORM-A-GRAM KEY No. 361-A

A NEW ONE-PIECE HOSE CLAMP has been developed by Tinnerman Products, Inc., which completely eliminates gears, thumb screws or intricate locking means. It can be snapped over the hose into pre-latched position by hand and final lock is made with an ordinary pliers. Since the clamp is made for low pressure connections, it has a lower



profile, is lighter in weight and exerts an even pressure around the entire circumference of the hose. Weight and assembly time are reduced because no threaded parts are used. The hose clamps are made of SAE 1060 spring steel with parkerize and zinc chromate primer finish and are available for all sizes of AN and Ordnance specification hose in a wide range from ½" OD and up. Full particulars will be sent by TINNERMAN PRODUCTS, INC., 2093 Fulton Rd., Dept. TJ, Cleveland 13, O.

INFORM-A-GRAM KEY No. 76.5-A

PROGRESS ON PARADE

CENTRIFUGAL PUMPS. A new type pump, with high volume delivery per horsepower and ease of maintenance, has been recently added to supplement the Gray-Mills Co.'s line of Superflo Centrifugal Pumps. The heavy duty pump motors, which are mounted integrally to the pumps for compactness, strength and streamlined design, range in various sizes—1/25, 1/8, 1/4 and 1/2 hp with volumes of 9 to 75 gph. Thirteen basic

models are available with many voltage characteristics. There are types for horizontal-external mounting; for vertical-external mounting; and other pumps with floating impellers which are made for submerging in the coolant reservoir. The latter may be used for fluids having abrasive content. Grease-sealed motor bearings and mechanical seals of the pumps require no lubrication. Full information—specifications, performance and construction data, and prices may be obtained by writing GRAY-MILLS CO., Dept. D, 1951 Ridge Ave., Evanston, Ill.
INFORM-A-GRAM KEY No. 555-A

NUMBERING MACHINE. A new model has been added to the Numberall Stamp & Tool Co.'s line of numbering machines for indenting numbers and letters on metals, plastics and other materials. This new machine, identified as Model 85, is designed with four wheels which are set to the required character by turning the knobs. If the knobs are pushed right or left, the last two wheels may be engaged and turned to the required number, making consecutive numbering fairly rapid since the last wheel is turned ten times and the second last wheel is turned once. The wheel for the "hundreds" is turned by hand or spanner wrench once every hundred, the fourth wheel is turned once every thousand. Although the Model 85 is not as fast as the automatic numbering machine, it is an economical substitute where production is not very high. It is available with $\frac{1}{8}$" to $\frac{1}{4}$" size figures. Letter wheels, with up to 11 letters and a blank on each wheel, can also be supplied. The new Model 85 heads can be furnished in sizes from 1 to 15 wheels and can be used in the Numberall Platforms No. 45, 46 and 47, respectively, or in power or foot presses. Further details will be sent by NUMBERALL STAMP & TOOL CO., Huguenot Park, Staten Island 12, N. Y.
INFORM-A-GRAM KEY No. 602-A

SKIN PROTECTOR. A new skin protective preparation for industrial uses has been developed by CADET LABORATORIES, Dept. MS6, Worcester 5, Mass. When this Sealskin is applied, it forms an invisible waterproof coating over the skin that acts as a preventive against occupational dermatitis—

skin infection, eruption and irritation. Most dyes, stains and grimes may be washed with soap and water without removing the protective coating. Sealskin is guaranteed to be absolutely harmless to the skin and its continued use over long periods will have no detrimental effects even on tender skins. In addition, Sealskin assists in restoring to normal, skin which has been chapped or irritated. Placed in the nostrils, it protects the membrane against fumes, sprays, dusts, powders and other irritants. A booklet called "Beneath the Surface", which describes

(TO PAGE 144—PLEASE)

INDUSTRIAL DIGEST

SCIENCE • RESEARCH • METHODS • TOOLING
PRODUCTION • TRADE NEWS AND REPORTS

Apprenticeable Occupations

To aid local offices of the United States Employment Service in referring service men to suitable apprentice training and also to assist industry, a booklet "Apprenticeable Occupations", the first in a national physical-demands information series, has been revised and released by the Division of Occupational Analysis of WMC. A summary of the physical activities and working conditions of all trades is included in the volume.

Definitions of true apprenticeship, which are reserved for the all-round skilled trades and which have been adopted by WMC's Apprentice-Training Service, include the following basic standards:

(1) An apprenticeable occupation is considered one that requires 4,000 or more hours to learn. (2) A schedule of work processes to be learned on the job. (3) A progressively increasing scale of wages for the apprentice that should average not less than 50% of the journeymen's rate over the apprenticeship period. (4) Provision for related classroom instruction; 144 hours per year of such instruction is normally considered necessary. (5) Terms and conditions of the employment and training of each apprentice to be stated in a written agreement and registered with the State Apprenticeship Council or the Federal Committee on Apprenticeship. The councils and Federal committee are composed of representatives of management and labor who register their programs and apprentices with the Apprentice-Training Service of WMC. (6) Review of local apprenticeship by the State Apprenticeship Council or the Federal Committee on Apprenticeship. (7) Apprenticeship to be jointly established by the employer and the employee. (8) Adequate supervision and the keeping of records for all apprenticeship programs.

Copies of the "Apprenticeable Occupations" booklet may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

"What's The Deal?"

The War Manpower Commission has announced that a radio recording is now being sent abroad in cooperation with the Armed Forces so that service men interested in making plans for apprentice training may be fully informed of the War Manpower Commission's program before embarking for home.

"What's the Deal?" is the title of the program, which includes a recording made by William F. Patterson, director of the WMC Apprentice-Training Service.

The recordings and reprints, to be played over 450 outlets of the Armed Forces Radio Service, as well as short wave stations in New York City and San Francisco, will be heard by service men in recreation rooms, camps and other assembly points.

Several excerpts from the script follow: "Apprenticeship is the only recognized way to learn a skilled trade. It is accepted by both employers and labor organizations as the sound way to become an all-round skilled worker. The apprentice is given on-the-job training in all the operations and processes of the trade; in addition he attends school

about four hours a week for training in subjects related to his trade.

"To be a true craftsman, to be able to perform all the work of a craft, is one of the best guarantees a man can have of reasonably continuous employment. Thoroughly trained men are the workers employers want. Further, apprentice-trained men are usually the ones selected for promotion to supervisors or foremen.

"As apprenticeship is a job and unlike a school where a person can easily make application for enrollment, it would be advisable for service men not to make application for apprentice training until they are separated from the service. If the veteran has not completed high school, he might complete that or build up his mathematics and science knowledge. There are more than 100 trades for which training is done through apprenticeship. Among them are automobile repair mechanic, machinist, electrician, boilermaker, chef, carpenter, cosmetologist, painter, decorator, and many others. To make application for apprentice training, service men are advised to go to the nearest U. S. Employment Office, or to an employer in the trade of his choice, or to the local labor organization."

"World Trade Routes"

To help reconstruct peacetime foreign trade to record proportions, arrivals and departures of all merchant ships operating in the Atlantic are now again being published and a new post-war guide to "World Trade Routes" has just been issued by the N. Y. Journal of Commerce.

Publication of ship movements to and from Europe, West Africa and most of South America, has just been given the green light by the Office of Censorship. It restores to American business men with overseas dealings a feature The Journal of Commerce has carried for the past 118 years except for intervals of censorship during World Wars I and II. In the early days of ship news reporting, carrier pigeons and fast clipper ships were utilized by the paper to speed the news of foreign arrivals.

A complete survey of available vessels, number of monthly sailings and ports of call in each of the principal ship routes of the world has been gathered in the "World Trade Routes" pamphlet. It traces the wartime fates of the world's merchant ships—from blue ribbon liners to the lowly tramps—and their contemplated peacetime uses. Copies of "World Trade Routes" may be had at 25 cents each from the N. Y. Journal of Commerce, 63 Park Row, New York 15, N. Y.

Operating Costs Key to Air Freight Growth

Speaking before the Chicago Aviation Forum, Louis C. Sorrell, director of research, Air Transport Association of America, stated that studies made for the domestic airlines show that sizable tonnages of freight are not likely to be carried by air until air cargo rates break through the 25 cents per ton mile level, including pick-up and delivery. The Chicago Aviation Forum is being conducted by the Chicago Association of Commerce and the University of Chicago.

Studies indicate, Sorrel said, that air cargo can obtain much larger volumes provided marked reductions in rates can be realized and provided good merchandising efforts are made by the traffic and operating men of the airlines, but they do not as yet suggest any serious invasion into railroad less-than-carload and carload traffic nor into the traffic carried by the trucks and waterways.

The realization of prospects for a substantial increase in air cargo business will depend, in Sorrell's opinion, more upon the reduction of airline operating costs than upon any other factor in the situation.

"Missionary rates," he said, "may assist in starting the cargo trend upwards; contract carrying may develop more planeloads of cargo; but main reliance must be placed upon all those efforts at whittling away the costs of air transportation in every direction: reduction of cost of fuel, of terminal handling, of

Ground Multiple

THREAD MILLING CUTTERS

by Continental

A Shell-type cutter with margin on each end
B Modified Acme thread form cutter
C Thread cutter button for Nall Planetary machine
D Shank-type cutter
E Shank-type two-diameter cutter
F Small diameter shank-type cutter with adapter
G Shank-type cutter

for fast, accurate production

Over 20 years' experience in precision thread grinding is built into CTW ground thread milling cutters . . . CTW ground thread milling cutters maintain dimensional accuracy on long production runs throughout the entire life of the cutter . . . Available in both shank and shell type, in National, Whitworth, Acme, V and special forms of thread. Many popular sizes carried in stock . . . For high production thread milling at lower tool cost, use Continental (CTW) ground thread milling cutters. Write to Continental today.

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CUTTING TOOLS

Boring Bars and Tools
Broaches
Broach Pullers
Broaching Fixtures
Core Drills
Counterbores and Countersinks
CTW Drive Holders
Counterbores (Tool Room Sets)
Counterbore Pilots
Inserted Blade Cutters
Carbide Tipped Cutters
Form Relieved Cutters
Milling Cutters
Thread Milling Cutters
End Mills
Side Mills
High Speed Steel Reamers
Carbide Tipped Reamers
Shell Reamers
Inverted Spotfacers
High Speed Steel Tool Bits
Carbide Tipped Tool Bits
Circular Form Tools
Cut-off Tools
Flat Form Tools
Dovetail Form Tools

45-41

plane operation, of maintenance, of traffic and sales—which over the years will produce ton-mile costs far below those of today. There is a good prospect of this, although previous sessions of this forum have indicated how far apart are the estimates of what is attainable. The airlines have many problems to solve: the design of an effective system of rates and tariffs that will promote air cargo; the solution of terminal organizational problems; the relations with other modes of transportation, upon which they must depend for completion of the cargo service. They must solve these problems quickly, while responding to public demands for a rapid expansion of their lines and services to other cities and communities. They will encounter strong competition from surface modes of transport who have great vitality, and who are by no means disposed to stand still while their lucrative traffic is drained away. The airlines cannot assume that their competitors are not alert to the situation; and are not able to counter with new combinations of rates and services. This postwar era in transportation should continue the dynamic trend which was so evident during the rise of the motor carriers to their position in the economic system."

Society of Industrial Designers

Fifteen of the nation's leading Industrial Designers have just announced the formation of the SOCIETY OF INDUSTRIAL DESIGNERS. The officers of the Society are: Walter Dorwin Teague, President; Raymond Loewy, Chairman of the Executive Committee; Henry Dreyfuss, Vice President; Harold Van Doren, Treasurer; and Egmont Arens, Secretary.

Every Industrial Designer in good standing in the United States will be eligible for membership so that the organization will be truly representative of the profession. The principle requirement for membership will be that each candidate for membership must have successfully designed a diversity of products for machine and mass production, or must be professionally engaged in teaching this field.

Tasks and responsibilities of a professional association will be assumed, along with the preparation of a code of professional practice.

Temporary office address: 55 West 42nd Street, New York 18, N. Y., Philip McConnell, Executive Secretary.

Baldwin Locomotive Forms Canadian Subsidiary

Formation of a Canadian subsidiary of the Baldwin Locomotive Works, to market in Canada such Baldwin products as turbines, water wheels, hydraulic presses, power tools and Diesel engines from headquarters to be opened soon in Toronto, is announced by Ralph Kelly, president of the parent company.

The wholly-owned subsidiary, known as Baldwin Locomotive Works of Canada, Ltd., will subcontract its orders to the United Steel Company, Ltd., which has four plants in Eastern Canada and headquarters in Toronto. All production will be under general supervision of Baldwin of Canada and will be from Baldwin designs and specifications.

Officers of the new company, elected at an organization meeting held in Toronto, are Ralph Kelly, president; W. Horace Holcomb, vice-president; W. N. Brownlie, managing director; H. D. Humphreys, secretary and treasurer; and T. E. McFalls, assistant secretary and assistant treasurer. All except Brownlie are officers of the parent company.

New Machinery Distributor

A new machinery distributing company has recently been formed by Harold Gardner, Paul Clasen and William Reiff, Jr., all formerly connected with the Cleveland Duplex Machinery Co. The new firm name is Garco Machinery Co., of 3030 Euclid Avenue, Cleveland 15, Ohio.

Garco represents a substantial group of machine tool builders and accessory lines, and in addition aims to render the same highly personalized services on machine tools as they have in the past.

Knock-Out
DRILL CHUCKS
are doing an ideal job on
SMALL ELECTRIC DRILLS
HEAVY DUTY DRILLS
DRILL PRESSES
RADIAL DRILLS
TURRET LATHES
ENGINE LATHES
and wherever good Chucks
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STATE
COMPANY

PUBLICATION PREVIEWS

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CATALOGS
BULLETINS
SPECIFICATIONS

OPTICAL CONTOUR COMPARATOR for visual comparison and measurement is pictorially described in Bulletin OC-305 available from the FISH-SCHURMAN CORP., Dept. J, 230 E. 45th St., New York 17, N. Y. Recommended for fast, detailed inspection of intricate shapes, this comparator is particularly adapted for inspection of parts from mass production which are not easily checked with ordinary gauges—for example: screw threads, dies, gears and parts of instruments such as gauges, clocks, etc. It is also useful as a strain finder, particularly for small objects which require considerable enlargement in order to reveal the strains.
INFORM-A-GRAM KEY No. 761-A

MACHINE TOOLS for drilling, boring, tapping and contour grinding are featured in a photographically descriptive Catalog, No. 1942, compiled by BAKER BROTHERS, INC., Dept. TD, Toledo 10, Ohio. Specifications of their various models of heavy duty drills are given. Model 150 has the capacity to drive one and one-half inch diameter high speed twist drills to the limit of their efficiency in steel. This machine is also adapted to boring, counter-boring, facing, forming and tapping operations.

Model No. 26-HO is a heavy duty, vertical, hydraulic feed machine, single and multiple spindle. This machine has a capacity of driving a 3" dia. drill in solid S.A.E. 1035 steel. Available feed pressure is 18,500 lbs with an average traverse speed of 195 ipm.
INFORM-A-GRAM KEY No. A63-A

BENCH MILLING MACHINE which is easily convertible from a vertical to a horizontal miller by simply interchanging the spindle attachments is described in an illustrated leaflet issued by the BENCHMASTER MANUFACTURING CO., Dept. T-9, 2952 W. Pico, Los Angeles 6, Calif. The overarm attachment provided for the horizontal mill gives outboard support for the end of the arbor in taking heavy cuts, or for slitting operations. The vertical mill attachment features a spindle arm which swings 60° each side of center, graduated in degrees.
INFORM-A-GRAM KEY No. 169-A

MASTERCASED CUTTING TOOLS are made by a super heat-treating process perfected by MASTERFORM TOOL CO., Dept. T, 2532-48 Irving Park Rd., Chicago 18, Ill., manufacturers and designers of special circular, flat, dovetail form tools, reamers, drills, countersinks, counterbores, end mills and associated products. Mastercased-Masterform precision cutting tools are made in a wide variety of types and sizes, to meet individual requirements. Further information is available in a 4-page bulletin published by the company.
INFORM-A-GRAM KEY No. 946-A

LUBRICATORS are presented in photographically descriptive Bulletin L-3360 released by the MADISON-KIPP CORP., Dept. TJ, 20 Waubesa St., Madison 4, Wis. The Model OL Lubricator is designed to fill a demand for the smallest possible lubricator to handle up to eight feed outlets. An oil reservoir may be applied in the base of the machine or any convenient place, and from this the OL Lubricator will pick up the oil and deliver it in measured quantities per minute.
INFORM-A-GRAM KEY No. B86-A

GROUND THREAD SOCKET SET SCREWS are featured in a leaflet published by the PARKER-KALON CORP., Dept. T-4, 200-202 Varick St., New York 14, N. Y. Their smooth, clean, gleaming finish has none of the nicks, burrs, or tool marks often encountered in set screws. Diagrams show the difference between the conventional method of cutting threads and the new Landis Tool method of centerless thread grinding.
INFORM-A-GRAM KEY No. 423-A

PORTABLE HONES that provide an economical means of accurately finishing bores from 2" to 14½" diameter are shown in a descriptive leaflet issued by SUNNEN PRODUCTS CO., Dept. T-7, 7900 Manchester Ave., St. Louis 17, Mo. These precision tools, used for salvage, repair, assembly, maintenance, and small lot production are ideal for correcting errors (within .0003" to .0005" with a minimum of stock removal) of taper and out-of-roundness from previous machine operation.
INFORM-A-GRAM KEY No. 583-A

Sharp, Clear Impressions
ON ALL METAL MARKING JOBS!

ANY METAL PART that requires a serial number, a catalog number, size identification—or any other type of marking—can be quickly and *clearly* marked with Mercury Steel Letters and Figures!

These Stamps are made of the finest carbon steel to protect against breakage and give you years of service on all part marking work. The letters or figures are deep cut with sharp faces for ease of stamping on even the hardest metals. Accurate bevel further assures clear impressions, and aids in alignment. The husky steel body is amply large to withstand severest use.

A large stock of Mercury Steel Letters and Figures in sets and sorts is available in sizes to meet a complete range of metal marking needs. Special sizes can be made to your specifications, if desired. *Write Dept. D for complete details, and briefly outline your marking problem for our recommendation on the Mercury Stamps to meet your needs!*

Metal Marking Tool Specialists for Over 25 Years

MERCURY METAL DIE AND LETTER CO.
546 EAST 16TH STREET, LOS ANGELES 15, CALIFORNIA

PUBLICATION PREVIEWS

MACHINE LEVELING JACKS are featured in a 4-page leaflet published by the ENTERPRISE MACHINE PARTS CORP., Dept. T-8, 2731 Jerome Ave., Detroit 12, Mich. Consisting of only three parts—the upper and lower castings and the adjusting screw—EMPCO Jacks are equally adaptable to any type of machine base. The two castings are so fitted as to permit sufficient "float" for self alignment. This feature presents a full bearing and maximum support either on an even or irregular floor. The smooth slipways permit upper casting to glide under base, raising or lowering it to a perfectly level position without altering its location. These Jacks are ideally suited for machine tools, special machinery, industrial furnaces, large surface plates, large assembly fixtures and tool room and production equipment.
INFORM-A-GRAM KEY No. E30-A

TOOL HOLDERS are pictorially described in Catalog C-39c published by the ARMSTRONG BROS. TOOL CO., Dept. T, 340 N. Francisco Ave, Chicago 12, Ill. These holders save all forging and most of the grinding. No stock of heavy tool steel need be carried, and points of various shapes can be kept on the lathe or in the tool room ready for instant use. The Armstrong Tool Holder System includes tool holders for every operation on the lathe, planer, shaper, slotter, turret lathe, etc., with over one hundred modifications of shape and size, all embodying the same economical and mechanical principle of an inserted cutter in a permanent supporting shank or holder, and adapted to all classes of work from the lightest to the heaviest.
INFORM-A-GRAM KEY No. C56-A

METAL CUTTING MANUAL containing detailed information on hack saws and band saws has been published by SPARTAN SAW WORKS, INC., Dept. D, 152 Fisk Ave., Springfield 7, Mass. The manual advises that wherever there may be a choice of teeth selection, fine teeth should be used on small sections and coarse teeth on large sections. It also advises keeping the saw tightened in the machine as a loose blade will wear more quickly and will not cut straight. Spartan Spring Temper Metal Band Saws are especially designed so they will cut for a long period of time before resharpening is necessary. They are recommended for the cutting of soft and thin sheets of metals, such as soft sheets, tubing, small mouldings and channels, soft aluminum, soft brass, soft bronze, certain types of plastics, etc.
INFORM-A-GRAM KEY No. 467-A

TILTING HEAD INDEX CENTER, machined for 1-2 inch standard Tee Slot installation and regularly furnished with spindles to receive No. 7 Brown & Sharpe tapers, is described in illustrated literature available from the BURKE MACHINE TOOL CO., Dept. TD, 301 East 16th St., Conneaut, Ohio. Spindles can be furnished at an additional charge to receive No. 3-C draw-in collets, maximum capacity 1-2 inch round. Spindles are threaded to receive chucks. The standard Index Plate furnished has 48 divisions. Extra Index Plates can be furnished with practically any divisions required including 360.
INFORM-A-GRAM KEY No. 661-A

SELF-RELEASING DIE HOLDER, a precision built tool designed for use on screw machines, turret and engine lathes, is pictorially described in Catalog "C" published by the ARC PRECISION TOOL CORP., Dept. T-6, 416 Broadway, New York 13, N. Y. Also featured in this catalog are lathe centers with permanently embedded hi-speed tips. The Arctool rotating center employs a superior arrangement of radial ball bearings and ball thrust bearings to handle the heavy loads for which it was designed. Thread measuring wires in convenient, inexpensive sets, in assortments of 14 sizes, for checking any type or size of screw up to 3½" thread are also described.
INFORM-A-GRAM KEY No. E29-A

HYDROILIC MULTIPRESS, a four-ton "HydrOllically-powered" and controlled press which affords downward ram pressures of from 300 to 8,000 and upward pressures to 5,000 pounds, at a touch of the control levers, is described in Bulletin 116 available from the DENISON ENGINEERING CO., Dept. TJ, 1197 Dublin Rd., Columbus 16, Ohio. Some of the fixtures and accessories which make for widespread amplification of the Multipress are described and illustrated. These include benches, extension tables and shelves, bolster plates, lower stroke limiting device, manual repeat stroke, automatic cycling, indexing tables, automatic cooling and others. More are in the process of designing and testing.
INFORM-A-GRAM KEY No. 260-A

"AIRGRIP" PNEUMATIC AND HYDRAULIC Holding Devices are described in an illustrated bulletin available from the ANKERHOLTH MFG. CO., Dept. T-5, 332 S. Michigan Ave., Chicago 4, Ill. The "Airgrip" Three Jaw Universal Chucks are designed to permit heavier cuts and coarser feeds, saving time and effort in production, and are of special service in heavy production work. Distinctive features of "Airgrip" Model "D" Air Cylinders include double ball bearing, permitting speeds heretofore impossible, no manual adjustments required, balanced air pressure—no end thrust, minimum friction, sturdy dependable construction, long life—low maintenance.
INFORM-A-GRAM KEY No. 952-A

What would be your Total Time on this Hot Press Die Job?

Courtesy — Revere Copper & Brass Inc. Dallas Division

This Hot Press Die, used for hot pressing spigot handles, was completed in a total time of 9 hours on a Milwaukee 2D Rotary Head Milling Machine. Compare this job report with your own methods:

Material — Hot Work Die Steel
Operation — Sink Cavities Complete
Time Distribution — Mill Cavities - 6 hrs.
bore core holes - - - - - 1 hr.
drill ejector pin holes - - - ½ hr.
mill relief around impression - 1½ hrs.
Total Time - - - - - - 9 hrs.

Check these advantages of the Milwaukee Rotary Head Milling Machine and how you can benefit from them in your own shop:

DIRECT . . . mills intricate shapes in a single set-up without the aid of templets or models — transmitting blueprint dimensions and outlines directly to the workpiece.

ACCURATE . . . chances for error are eliminated because there is no change in setup. Exact control of all combinations of cutting movements — possible only with this machine — transmits mathematical precision to the work.

FAST . . . initial job preparation and setup time are reduced to the minimum. Accurate performance of the machine saves operator's time and results in rapid production of work otherwise difficult to perform.

Write for Bulletin No. 1002C and complete information.

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PUBLICATION PREVIEWS

FIRTHITE GENERAL-PURPOSE TOOLS are detailed in a price list and catalog, FE-121, covering the ten styles of these tools produced by the FIRTH-STERLING STEEL CO., Dept. D, McKeesport, Pa. In the straight turning tools, five sizes have been added to each of four styles. Four sizes have been added on the line of square-nose tools, while to four styles of the offset turning and boring tools, four additional sizes each have been added. The new price list for Firthite-Tipped Centers, FE-122, shows the complete range of standard sizes carried in three styles—Morse, Brown & Sharpe, or Jarno—of taper.
INFORM-A-GRAM KEY No. 10-A

EXPANDING MANDRELS with "Roller Clutch Expansion" are described in illustrated literature available from the YOUNG ARBOR CO., Dept. TD, 3257 Bradford Rd., Cleveland Hts. 18, Ohio. Work placed on the mandrel is locked automatically — ready for cutting tool, grinding wheel, deburring or polishing operations. Extreme cutting pressure merely results in tighter holding of work. Material cut under heavy pressure releases as easily as under a deburring operation. This ruggedly constructed tool maintains concentricity in low tenths for the entire length of the workpiece.
INFORM-A-GRAM KEY No. B52-A

KALAMAZOO BAND SAW cuts anything that will go into the throat, states an 8-page booklet published by the KALAMAZOO TANK & SILO CO., Machine Tool Div., Dept. D-4, Kalamazoo, Mich. This metal cutoff band saw has 12 outstanding mechanical features which include hydraulic frame control, quick acting vises, automatic feed, four speeds, blade guides, motor and tension spring. The Kalamazoo coolant system permits high speed cutting on the Kalamazoo metal cutting band saw. It is especially desirable in making heavy cuts on extremely hard metal where there is excessive heat generation.
INFORM-A-GRAM KEY No. A89-A

AMC DEMAGNETIZER which speeds milling, drilling and punching operations is described in an illustrated circular issued by ALOFS MFG. CO., Dept. TD, 1619 Madison Ave., Grand Rapids 7, Mich. This portable magnetizer and demagnetizer is available in two standard sizes—115-volt or 220-volt alternating current. Electroplaters find it valuable in preparing parts for plating. Metal particles which often ruin the finish in the buffing process will readily wash off after demagnetizing before plating. Some manufacturers use it for magnetizing screwdrivers, small socket wrenches and tools for reaching difficult assemblies.
INFORM-A-GRAM KEY No. 996-A

ILLUMINATED MAGNIFIERS which increase your vision 7, 20 or 40 times are pictorially described in a bulletin available from R. P. CARGILLE, Dept. TD, 118 Liberty St., New York 6, N. Y. These portable magnifiers can be used in the dark. Brilliant illumination is provided by the built-in lighting units (there are models for battery control and models for electric control). The reflected light illuminates opaque materials and is easy on the eyes.
INFORM-A-GRAM KEY No. C38-A

NIAGARA AERO AFTER COOLER, a new method of compressed air after-cooling, which removes more moisture and provides drier air is described in Bulletin 98 issued by the NIAGARA BLOWER CO., Dept. J, 6 East 45th St., New York 17, N. Y. It also provides controlled temperature for jacket and inter-cooler water with the Niagara "Balanced Wet Bulb" control. This helpful machine protects all air tools, grinders, hammers and riveters from freezing and from loss of lubrication when the air is thoroughly dried in the Niagara Aero After-Cooler.
INFORM-A-GRAM KEY No. 411-A

PRECISION EQUIPMENT for the tool and machine industries is described in illustrated Catalog No. 836 released by THE CHALLENGE MACHINERY CO., Dept. T-5, Grand Haven, Mich. Included are time-saving devices for tool and machine shops and precision equipment for layout, inspection, assembly and general production. Specifications and illustrations are given of layout surface plates, angle plates, reading and checking tables, turntables, workbenches and other helpful equipment.
INFORM-A-GRAM KEY No. 431-A

OPEN-END BAR SHEARS—Pressures, capacities and general specifications for a new line of open-end vertical bar shears are given in Bulletin 317 recently issued by the THOMAS MACHINE MFG. CO., Dept. T-4, Pittsburgh 23, Pa. These machines, designed in ten sizes and with ram pressures of from 25 to 300 tons have shearing capacities for rounds ranging from 1" to 3". The open-end feature represents a major improvement over conventional closed-end shears, enabling quicker, more accurate handling and making the shear blades easy to see and change.
INFORM-A-GRAM KEY No. 994-A

"PRECISE PRODUCTION", the current issue of the GEORGE SCHERR CO., Dept. T, 200 Lafayette St., New York 12, N. Y., periodical, which has just come off the press, features the Gibbs Swiss-Type Automatic Screw Machine. By means of drawings and photographs, the special Swiss principle of operation, whereby the rotating bar feeds toward the tools, is thoroughly explained. Shown too are examples of the finish and precision possible without secondary machine work.
INFORM-A-GRAM KEY No. 490-A

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Material—S.A.E. 1020 Seamless Steel Tubing.
Operation—Rough and Finish Milling of 10 Wells (varying from 3/4" wide x 3/4" long . to 35/64" wide x 2" long), .062" deep.
Cylinders—99/16" O.D. x 725/32" long.
Feed—Manual Spindle Speed—4,000 r.p.m.
Tolerances—±.005".
Time—Roughing 18 minutes; finishing 23 minutes; total floor-to-floor, 43 minutes. (10 wells complete, average 4.3 min. per well.)

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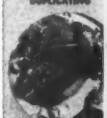

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PUBLICATION PREVIEWS

GAGES — Adjustable Inside, Adjustable Service, Recess-Shoulder and Adjustable Screw Thread Gages are described in a 4-page illustrated folder issued by the EDDY MFG. CO., Dept. TD, 321 Pine St., Pawtucket, R. I. These gages can be reset and used over again. The Eddy Adjustable Inside Gages can be used in place of plug gages, size blocks, planer gages, keyway gages, spring calipers, and telescoping gages, and have many advantages. They are practical to set and use for gaging in boring or grinding a single hole or in the large production jobs of many thousand pieces.
INFORM-A-GRAM KEY No. E27-A

FILES & RASPS and X. F. Swiss Pattern Files are shown in an illustrated 64-page catalog issued by the NICHOLSON FILE CO., Dept. TDJ, Providence 1, R. I. For faster filing on soft irons and steels their patented tool construction known as "Controlled Serrations" is recommended. This means that each tooth point is subdivided into extra cutting edges which permit the file to take hold of the stock from the first stroke and to remove more metal than ordinary files.
INFORM-A-GRAM KEY No. E31-A

DRILL JIG BUSHINGS are featured in Catalog No. 344 published by the ACCURATE BUSHING CO., Dept. DJ, Garwood, N. J.. A brief description of each type of bushing is given on each table together with the most common applications. Headless press fit bushings are used whenever it is desirable to have the bushing flush with the jig plate; also in those cases where the distances between centers of the holes to be drilled are too short to permit the use of bushings with heads.
INFORM-A-GRAM KEY No. 811-A

LIVERMONT TORQ-STOP TOOLS are described in an illustrated catalog released by RICHMONT, INC., Dept. T, 215 W. 7th St., Los Angeles 14, Calif. These tools eliminate sheared bolts and studs, stripped threads, broken screw-heads, and, in the case of sheet metal, plastics, etc., damaged material. All models of the Livermont Torq-Stop Wrench operate on the principle of sound and touch indicating signals. Manufactured with various heads to accommodate all standard sizes of caps from 15mm to 120mm, the Livermont Torq-Stop Bottle Cap Wrench fits snugly over plastic or metal caps and tightens accurately to pre-determined torque as specified by the user. Leakage is eliminated as proper tightening is assured.
INFORM-A-GRAM KEY No. C52-A

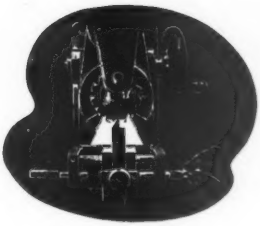
UNIVERSAL CUTTERS AND TOOL GRINDERS are highlighted in descriptive bulletins available from the GALLMEYER & LIVINGSTON CO., Dept. T-9, 304 Straight Ave., S. W., Grand Rapids 4, Mich. The Grand Rapids No. 60 Universal Cutter and Tool Grinder with self-contained motor drive is built to meet the needs of the manufacturer requiring a modern machine providing for maximum convenience of operation in the sharpening of milling cutters, gear cutters, reamers and similar tools. Provision is made for operation of longitudinal, transverse, and vertical movements from most any necessary position.
INFORM-A-GRAM KEY No. 625-A

INDUSTRIAL TRANSMISSIONS for all kinds of machines are presented in a new photographically descriptive catalog published by the DRIVE-ALL MFG. CO., Dept. D, 3400 Conner Ave., Detroit 14, Mich. Actual applications of these transmissions to various types of machines are shown. Drive-All is used on conveyors, agitators, blowers, mixing machines, food and other processing machines, laundry equipment, etc., as well as on all types of machine tools.
INFORM-A-GRAM KEY No. 570-A

PINION AND GEAR CUTTING MACHINES are described in Bulletin 112 published by WALTHAM MACHINE WORKS, Dept. T-5, Waltham, Mass. These bench machines are primarily designed for fine pitch mechanisms such as are used in watches, instruments, time fuses, etc., but have more weight and a greater capacity than is usual in such machines. The same patterns are used for the castings of all the several types that can be furnished. All make use of the same process, i.e., a revolving cutter makes successive cuts on blanks held and indexed by the work spindle and usually supported by a tail center. Only straight teeth can be cut.
INFORM-A-GRAM KEY No. 514-A

PROTECTED-TYPE MOTOR, designed for both drip-proof and open motor applications, is illustrated in a descriptive 4-page folder published by the Crocker-Wheeler Div. of JOSHUA HENDY IRON WORKS, Dept. T-6, Ampere, N. J. A cutaway view of the motor, illustrating the various design features, is included to show how this construction provides protection against many of the most common hazards encountered in operation. It is pointed out that the motors are rated on the same basis as conventional open types—40 C rise, full-load continuous duty, with a 15 percent service factor.
INFORM-A-GRAM KEY No. 748-A

"T AND V" CUTTING ALLOY—This cast-to-shape, non-ferrous alloy that effectively bridges the gap between high speed and cemented carbide cutting tools is discussed in a pocket-size booklet published by the JESSOP STEEL CO., Dept. TD, Washington, Pa. "T and V" differs from high-speed steels in that



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it does not respond to any type of heat treatment or annealing. Its hardness range is from 60 to 62 Rockwell C. Even intermittent cutting of chilled castings is possible due to the inherent toughness of this alloy.
INFORM-A-GRAM KEY No. 259-A

NEW DEFIANCE MILL—A new 2½" horizontal boring, milling, drilling and tapping machine, built to meet every requirement of machine tool users where intensive production and precision work is required, is detailed in an illustrated 8-page bulletin published by DEFIANCE MACHINE WORKS, INC., Dept. T-4, Defiance, Ohio. This machine is especially suited to the needs of tool rooms for small jig and die work.
INFORM-A-GRAM KEY No. 140-A

OFFSET BACK SPOTFACER—A 4-page bulletin, BSF445, containing engineering data, relative to application of an offset Back Spotfacer, both standard and special machine, has just been released by EDLUND TOOLS, INC., Dept. T-5, 4473 Woodward Ave., Detroit 1, Mich. It details typical applications and includes specifications of standard models, cutters and pilots carried in stock.
INFORM-A-GRAM KEY No. A62-A

DRILL PRESSES are featured in photographically descriptive Catalog D43 issued by the ATLAS PRESS CO., Dept. TD, 1012 N. Pitcher St., Kalamazoo 13D, Mich. These presses step up production on the full range of small-hole drilling and tapping operations. The heavy massive base casting is a rigid foundation for the entire drill press. It provides an auxiliary table for extra long work. The rugged ground steel column maintains accurate alignment of head, table and base.
INFORM-A-GRAM KEY No. 537-A

KELLERFLEX Flexible Shaft Machines and Accessories are most effectively described in a new 48-page catalog issued by PRATT & WHITNEY, Division Niles-Bement-Pond Co., Dept. TJ, W. Hartford 1, Conn.

The What, Why and How of the Kellerflex, the "most versatile machine in the shop", is very clearly illustrated by many photographs showing the different types of machines with their accessories, and the numerous operations which can be performed with them.

The Kellerflex was originally designed to meet the demand for a flexible shaft machine to be used for filing and polishing dies, molds and patterns. Its proved value in this field led to the design of other sizes, new attachments, new acessories for use on a tremendous number of operations in practically every field of manufacturing where burring, filing, sanding, grinding, wire-brushing or polishing is necessary. These machines with component tools have proved such labor-savers, when compared with the old hand methods, that they are frequently referred to as "mechanical muscles". To the shop, this means an easier and faster way of doing a job. To management, it means finer, faster production at lower cost.

The Kellerflex multiple speed flexible shaft machines are available in six models and the direct drive or single speed machines in seven models. Stands come in three different heights for bench use and three floor roller types. The machines are interchangeable on the different stands without using tools or special adaptors.
INFORM-A-GRAM KEY No. 430-A

PRECISION TAPPING AND THREADING MACHINES is the subject of a descriptive bulletin recently published by the WARNER & SWASEY CO., Dept. TD, 5701 Carnegie Ave., Cleveland, Ohio. A complete line of these machines, known as the new "Warner & Swasey Precision Tapping & Threading Machines," is now available in capacities ranging from 0-80 to 1½" in steel and to 2½" in soft material. These machines have been designed for quantity production where class 3, 4, and 5 gage fits are required.

Extreme precision is obtained by means of a patented leading-on mechanism which consists of a hardened and precision ground lead screw operating against brass guide fingers to provide a positive lead free of backlash or drag. Prolonged tap life is assured by the safety clutch which can be adjusted to the safe torsional resistance of the tap and the type of material used. Flexibility of these machines provides for cutting, either internal or external, right or left hand threads, in plastics, aluminum and its alloys, magnesium, bronze, nickel, and stainless steel, and chrome-molybdenum alloys.
INFORM-A-GRAM KEY No. 515-A

"HELI-COIL" INSERT KITS for field servicing, salvage and maintenance of stud and cap screw assemblies are described in Bulletin 240 issued by AIRCRAFT SCREW PRODUCTS CO., INC., Dept. J, 47-23 35th St., Long Island City 1, N. Y. "Heli-Coil" Screw Thread Inserts are precision-formed stainless steel or phosphor bronze helical coil wire bushings. They are used chiefly to provide a hard, anti-friction, protective lining for the edges and surfaces of tapped threads in aluminum, plastics, plywood, and other soft metals.
INFORM-A-GRAM KEY No. 177-A

CHUCKS — Independent, Universal, Combination, Light Duty and Drill Chucks are featured in Catalog No. 600 available from the WESTCOTT CHUCK CO., Dept. TJ, Oneida, N Y. Specifications and illustrations of each chuck are included along with price lists.

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PUBLICATION PREVIEWS

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INFORM-A-GRAM KEY No. 519-A

PRIMER OF PREPARED ATMOSPHERES which describes the different types of furnace atmospheres, their preparation, application and relative cost has been prepared by SURFACE COMBUSTION, Dept. T-7, Toledo, Ohio. This booklet states that the most common constituents encountered in prepared atmospheres are nitrogen, carbon dioxide, carbon monoxide, water vapor, hydrogen, hydrocarbons such as methane, and in some instances small traces of oxygen. With the exception of molecular nitrogen, all of these gases will react with steel. For the average annealing and hardening temperatures, the effects of these gases upon steel are summarized.
INFORM-A-GRAM KEY No. 810-A

GRINDING & POLISHING DUST COLLECTOR for jewelry, novelty, light metal work and dental laboratory work is described in Bulletin 31645 issued by LEIMAN BROS., INC., Dept. J, 146-181 Christie St., Newark 5, N. J. Cloth bags inside square metal containers catch and hold all dust. Sturdily built to last a lifetime these polishing dust collecting outfits are attractively finished so that they are an ornament to any workroom. Being thus heavily built they are without vibration or noise and may be used in any location.
INFORM-A-GRAM KEY No. 362-A

HYDRAULIC PACKING that does away with extrusion damage is described in an interesting booklet published by the WEATHERHEAD CO., Dept. TD, 300 E. 131st St., Cleveland 8, Ohio. One of the most outstanding feaures of the Weatherhead T-Ring Packing is the fact that it eliminates the damaging effect of extrusion of packing material into the clearance space between the mating parts. The elimination of extrusion marks a signal step forward in seals. This T-Ring Packing is recommended to many diversified industries for use as seals in cylinders, swivel joints, struts, and other applications including those where pressures are considerably above current practices.
INFORM-A-GRAM KEY No. 101-A

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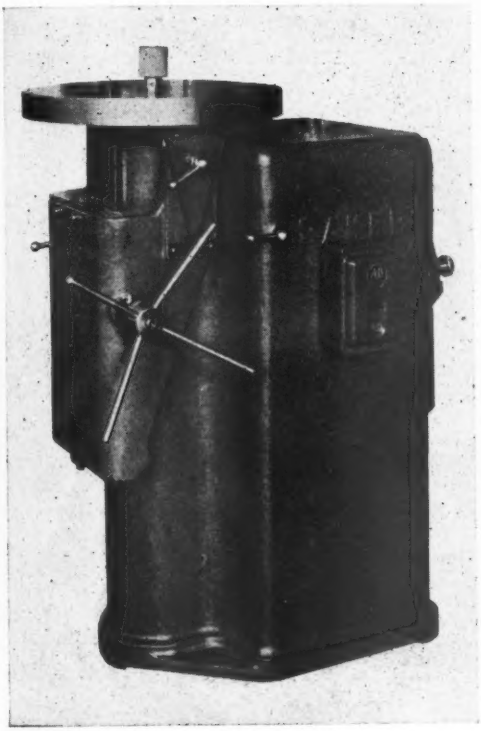

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For complete details send for our folder.

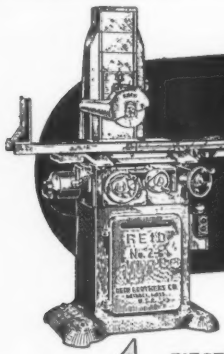
PUBLICATION PREVIEWS

LOW TEMPERATURE BRAZING News Bulletin No. 31 has been published by HANDY & HARMAN, Dept. T-9, 82 Fulton St., New York 7, N. Y., for the particular attention of design and production engineers. A "before and after" story of an airplane hydraulic brake cylinder is featured. Easy-Flo brazing is a simple process that makes brazed construction practical. Joints are strong, leak-tight, corrosion-resistant and extremely ductile because of the silver content of the brazing alloy. And because it is extremely free flowing at only 1175° F, Easy-Flo is simple to work with and easy to heat to brazing temperature.
INFORM-A-GRAM KEY No. 310-A

VERTICAL MILLING & DIE SINKING MACHINE with back geared spindle construction is pictorially described in Circular 18-3VG-2 published by the REED-PRENTICE CORP., Dept. TJ, Worcester, Mass. Spindle and motor pulleys are four step, providing, by direct pulleys, ten spindle speeds with constant speed motors; twenty spindle speeds with 900/1800 rpm two speed motor; and five or six additional speeds with back gear drive to spindle. The No. 3VG Reed-Prentice Vertical Milling and Die Sinking Machine has a new design feed box with individual built-in motor drive which is of the direct reading dial type. Eighteen changes are obtained in numerical order from ½ to 20½" per minute.
INFORM-A-GRAM KEY No. 746-A

MILLING MACHINES are pictorially described in a 32-page booklet published by the VAN NORMAN CO., Dept. J, Springfield 7, Mass. Horizontal, vertical, contour and ram type universal milling machines are shown along with radius grinders, attachments, bed type production miller, hand mill and high frequency induction heating equipment. The utility ranges of vertical, horizontal and angular machines, together with a number of operations usually carried out on other equipment with a minimum of resetting, are combined in the ram type universal miller. Induction Heating Equipment is being widely used for forging, annealing, brazing and soldering. It eliminates possible distortion and warping often encountered in other methods of heat treating and leaves the work free from undesirable scale.
INFORM-A-GRAM KEY No. 683-A

HEAT TREATING BATHS and Furnaces are discussed in a 4-page folder recently issued by the A. F. HOLDEN CO., Dept. T-9, New Haven, Conn. This 3 in 1 unit provides uniformity of hardness and heating on thin or heavy sections. Many types of tools such as form tools, hobs, taps, etc., are now hardened to size without refinishing. These Baths for ferrous and non-ferrous metals are listed with their respective melting points, operating ranges and uses.
INFORM-A-GRAM KEY No. 150-A



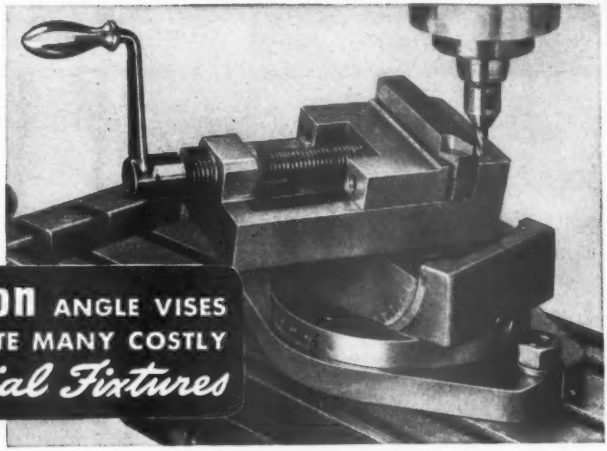
ACCURACY at it's BEST!

"To the Tenth!"

PIECE AFTER PIECE - HUNDRED AFTER HUNDRED - ACCURACY AT IT'S BEST - REID GRINDERS ARE BUILT TO PRODUCE THAT RESULT - CLOSE TOOL ROOM WORK OR GANG-UP PRODUCTION ARE AT YOUR FINGER-TIPS ON A REID GRINDER.

Send for Catalog and Price List Today

REID BROTHERS CO., INC. BEVERLY, MASS.



WESSON ANGLE VISES
ELIMINATE MANY COSTLY
Special Fixtures

FOR CUTTING COSTS NOW, FOR MACHINE FLEXIBILITY DURING RECONVERSION PERIOD

Their compact size, lowest overall height, ability to work in close quarters, and wide range of capacity, permit WESSON Angle Vises to multiply the uses of many standard machine tools without resorting to special angle fixtures. In toolroom or production work WESSON Vises slash set-up time and cut costs . . . earn back their price many times over!

The 3-Way Universal feature of WESSON Angle Vises eliminates the need of many costly fixtures for holding angle work. This is a mighty important advantage in avoiding "toolroom blockades" and difficulties in designing and producing individual angle fixtures. Speedy precision compound angle set-ups are made simple . . . in toolroom or production work, where a series of these vises often are used with fixed set-ups, since each vise may be removed from any machine without disturbing the set-up or the workpiece.

ORDER NOW FOR IMMEDIATE DELIVERY!
These versatile, top quality, high precision WESSON 3-Way Angle Vises are available now — use the most efficient multiple adaptations for present or postwar production. BE PREPARED . . . BUY NOW!

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Universal VISES
BUILT TO WESSON STANDARDS OF QUALITY AND PRECISION

WESSON PRODUCTS CO., Dept. MM-7,
709 Fisher Bldg., Detroit 2, Michigan

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

Name and Title.....

Firm Name .....

Address..... City & State.....

PROGRESS ON PARADE

(CONTINUED FROM PAGE 124)

many of the causes of infection from which Sealskin protects the skin, will be sent free upon written request by Cadet Laboratories. *INFORM-A-GRAM KEY No. E2-A*

DOUBLE SWIVEL DIVIDING HEAD. The new Ellis Dividing Head is an accurate tool with an unusually wide range of adaptability. Produced by ELLIS-LAWYER TOOL COMPANY, Dept. TJ, Alhambra, Calif., it embodies all the traditional usefulness of a standard 40:1 ratio crank-indexing Dividing Head, but in addition it is regularly equipped with an auxiliary swivel base and a direct indexing attachment which greatly increases its utility as a tool making or production unit. Being carefully built of the best materials, positive adjustment is provided between the precision ground worm and worm gear to insure freedom from spindle back lash. The auxiliary swivel base makes possible quick, accurate work setting to compound angles, swinging through 360° in the horizontal plane, and in

excess of 100° in the vertical plane. This feature effectively converts a conventional dividing head into a universal work head or rotary table, thereby increasing the versatility of the miller, grinder, drill press or jig borer. The quick indexing attachment consists of a spring loaded plunger located on the spindle housing, which works in conjunction with index plates mounted face plate fashion on the spindle nose. It is a matter of seconds only to disengage worm and worm-wheel in order to prepare the spindle for direct indexing, thus converting the Dividing Head into a fast, production indexing unit. Standard head is right hand type. Spindle is reversible for left hand operation.
INFORM-A-GRAM KEY No. E26-A

LIFT TRUCK OVERHEAD GUARDS. For the maximum protection of lift truck operators from falling objects, Towmotor Corporation has developed overhead guards to fit all Towmotor lift trucks. These are ruggedly constructed of steel tubing and when installed extend in front of, over and behind the

operator, without restricting or inconveniencing him. Transverse lengths of 1½" steel tubing in front and above are notched and arc-welded to side members of frame. Back sections of the side frame members are made of 1½" standard black steel tubing, while the front sections, which telescope over the back sections, are 2" in diameter. Installation of the guard requires only 10 or 15 minutes. Full particulars can be obtained from the manufacturer, TOWMOTOR CORPORATION, 1226 E. 152 St., Dept. TJ, Cleveland, O.
INFORM-A-GRAM KEY No. 495-A

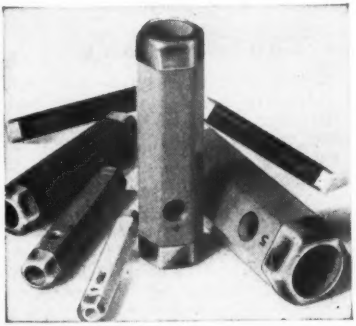
NEW GEROTOR AIR CYLINDERS. A complete absence of tie rods is featured in the new design of the Gerotor May Corporation's double-acting, non-rotating air cylinders. Its keeper ring design assures leak-proof construction and permits covers to be rotated to any position for convenient location of pipe connections. This type of construction also permits more compact design of the cylinder and allows it to be applied in a minimum of space. Gerotor cylinders can be used for 150# air and 300# oil and water service. Those used for oil hydraulic service can be had with auto type piston ring construction. Self-adjusting composition packings are used for cups and piston rod, and have been selected for the three services to provide long life and minimum friction. Other features: large pipe connections; ample bronze rod guide; over-size alloy piston rod; heavy duty piston assembly and heavy duty alloy covers. For illustrative literature, write GEROTOR MAY CORP., 444 Tacoma Ave., Dept. TJ, Logansport, Ind.
INFORM-A-GRAM KEY No. E13-A

FEDERAL

Taperlock Plastic

GAGE HANDLES

Made of durable plastic material, one-third lighter than aluminum. This lightness permits a most sensitive "touch" with less fatigue . . . an advantage appreciated by women inspectors.



Federal Taperlock Plastic Gage Handles have proved very satisfactory for glass gages. Being so much lighter than metal handles, the danger of chipping and breaking is greatly reduced.

Plastic Handles insulate, protecting gages from bodily heat which might affect accuracy.

Easily marked for identification with the same tools used for marking metal handles. Available in SEVEN sizes—00 for small gages, 0, 1, 2, 3, 4 and 5. In FOUR colors — Red, Green, Yellow and Black.

IMMEDIATE DELIVERY
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Oliver
OF ADRIAN
DIE MAKING MACHINES

USE THE OLIVER (THE ORIGINAL) DIE MAKING MACHINE TO REDUCE THOSE DIE COSTS

It is a proven fact that savings as high as 50% to 60% over hand methods are yours by using an **Oliver Die Making Machine** to saw out and file those intricate shapes such as DIES, GAGES, CAMS, TEMPLATES, STRIPPER PLATES, etc.

More than 10,000 machines in use attest to their longevity and superiority.

By using an Oliver, you can use fewer skilled mechanics, and get the job on time.

The Oliver is constructed to Machine Tool Standards and has 30 years of experience behind it.

The 8-1 Model, illustrated, is designed for 1" materials and priced at $125. Other models for 3" heavy duty jobs.

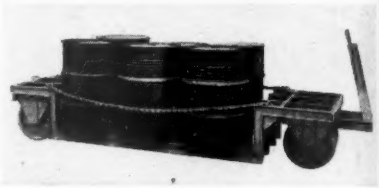
Avoid cheap copies—demand the Original—the Oliver. Send for literature—no obligation.

We also build Drill Grinders, Tool and Cutter Grinders, Face Mill Grinders, Template Tool Bit Grinders, Point Thinners

OLIVER INSTRUMENT COMPANY
1436 E. Maumee ST. Adrian, Michigan

Underslung Trailer

For really getting down to earth, Palmer-Shile Company, Dept. DJ, 788 South Harrington St., Detroit 17, Mich., is producing this underslung trailer. It is designed with the platform lowered to within a few inches from the floor to provide an exceptionally low center of gravity for easy loading from floor, skid or rack. At a 6¼" height from the floor, the roomy platform measuring 38"



wide by 78" long accommodates heavy loads which roll easily and safely by means of heavy metal wheels with rubber tires and ball bearings. Drums, barrels or other loads liable to shift are held secure by strong chains. This trailer has an all welded structural steel framework, strongly braced and heavily reinforced to safely and quickly handle loads as heavy as 2½ tons, with ease. Exclusive of the draw bar (40" long) the trailer overall length is 126". Additional details and complete specifications are available in a bulletin which can be obtained from the manufacturer.
INFORM-A-GRAM KEY No. 421-A

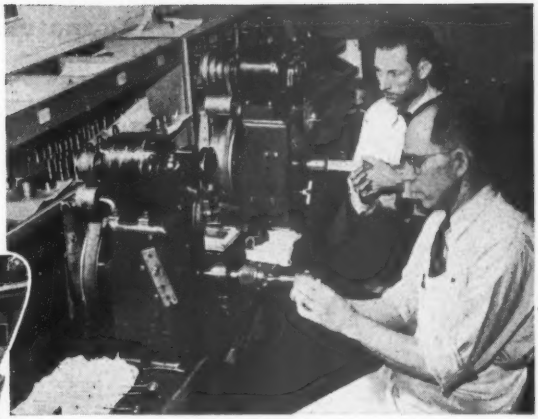
★

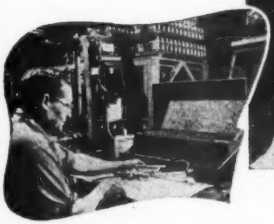
Battelle Catalog

A 72-page catalog of publications and patents has just been published by Battelle Memorial Institute, Columbus, Ohio, founded to advance education, science and industry through research and the dissemination of technological information.

The new catalog lists more than eight hundred Battelle instigated contributions, books and patents for 1929 to 1944 inclusive, and covers subjects in organic chemistry, electro-chemistry, chemical engineering, graphic arts, welding technology, applied mechanics, mineral dressing, industrial physics, ceramics, fuels and metallurgy.

At right, two of the bench type Sunnen Precision Honing Machines used in gauge manufacturing at C. G. Conn Ltd. *Below,* checking a valve casing on one of the famous Conn instruments.





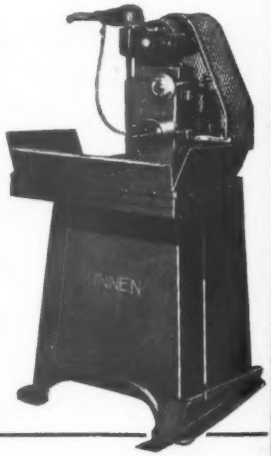
Sunnen Precision Honing Used in Finishing Gauges to .00002" at C. G. Conn Ltd.

On valve casing gauges, used in making the famous Conn musical instruments, the Sunnen Precision Honing Machine is being used to obtain a tolerance of .00002" in high-grade tool steel.

Here's a real precision job that is helping Conn to produce musical instruments, aircraft and marine navigation instruments, electronic testing equipment, silver-coated aircraft bearings, etc.

The Sunnen Precision Honing Machine will hone any surface from .185" to 2.625" in diameter — in any metal or plastic except lead and babbitt — produce a super-smooth finish — with a guaranteed accuracy of .0001" — accurately duplicate sizes — without jigs or fixtures — can be set up in one minute — and does not require skilled labor.

Write for complete information.



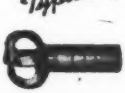
SUNNEN PRODUCTS COMPANY

7947 Manchester Ave., St. Louis 17, Mo.

Canadian Factory: Chatham, Ontario

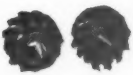
SUNNEN

Typical Jobs



Compressor Yoke. Alignment maintained and better finish produced.

Saved time in producing a smooth accurate finish on this bronze remote control valve body.



Automobile Distributor Shaft Gears. Taper removed at a rate of 80-90 per hour.

Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hole.

Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.

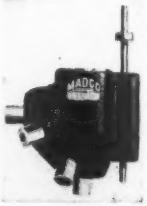
Yes, SEXTUPLE is the word for it! By using a MADCO Turret Drill Head, you can position *six* drilling tools in your drill press instead of only one . . . and gain increased production at lower cost.

Check these features:

1. **New Indexing Depth Stop to accurately control drilling depth of each spindle.**
2. **Six precision ground spindles with either Morse or Jacobs taper.**
3. **Safety, friction type driving mechanism . . . no gears or teeth.**
4. **Guaranteed drilling accuracy to .001".**

MADCO Turret Drill Heads are easily attached to 14" to 17" Deltas; 15" and 20" Buffalos; 15" Walker-Turners; and to Allens, Sipps, and many other drill presses.

Three models are available for immediate delivery; Model 273, with either Jacobs No. 2 or No. 33 taper spindles; Model 274, with No. 1 Morse taper spindles; and model 275, with No. 1 Morse taper spindles and MADCO Indexing Depth Stop. Prices range from $123.00.

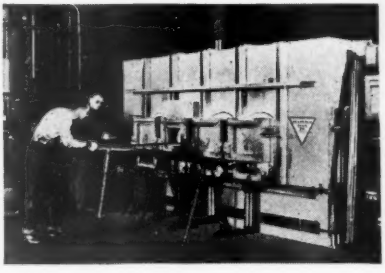


Write for complete information today!

MADCO PRODUCTS, INC.
516 FIFTH AVE., NEW YORK 18

Despatch Forging Furnace

A new type Despatch controlled atmosphere forging furnace is announced by the Despatch Oven Company, Dept. TD, 619 S. E. Eighth St., Minneapolis 14, Minn. This new furnace recently installed in an aircraft plant, produces 33⅓% more than the combined total output of the three furnaces previously used, while occupying only half of their required floor space. Because of



its special four-in-row muffle arrangement, this compact and highly efficient furnace occupies a space only 12 ft wide by 6 ft deep. Each muffle is 12" in diameter and has a working depth of 36". Uniform heat through the entire 36" working depth of muffles is achieved by the ingenious Despatch system of back-towards-front firing. In processing hard steel forgings at 2250 degrees F, this controlled atmosphere furnace uses nitrogen gas and handles over 2300 pieces per day. The air-operated doors open quickly for prompt removal of forgings from the roomy, convenient level hearths. This straight in line hearth arrangement makes direct-to-press handling possible. A single automatic-control system operates quick-response fuel valves to maintain heat accurately in all four mufflers. The Despatch controlled atmosphere furnace is available in all sizes with gas or oil firing system.

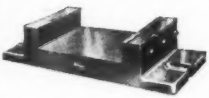
INFORM-A-GRAM KEY No. 584-A

A "three star" Army-Navy "E" award, for excellence in war production, has been granted Stewart-Warner Corp, Division One, 1826 Diversey Parkway, Chicago.

SAVE TIME

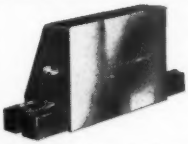
WITH

CHALLENGE HOLDING FIXTURES



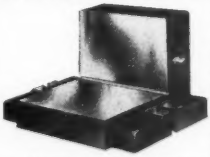
● Get maximum production from Your Boring Mills, Surface Grinders, Milling Machines, Planers, Shapers and Drill Presses with these strong, rigid, special analysis semi-steel, heat-treated Holding Fixtures. Style A is made in three standard sizes —16½ to 24 ins. long by 6 ins. wide.

ANGLE HOLDING FIXTURE



● A new holding fixture of wide adaptability for machine work. Precision ground to within .0005 of an inch in 6 inches. Three standard sizes 6 to 12 inches.

INSIDE ANGLE HOLDING FIXTURE



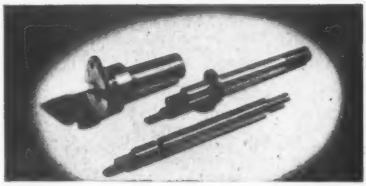
● Specially designed for fastening to table of machine and to provide a means of clamping work while machining. Planer finish on working surfaces. Three standard sizes 6, 9 and 12 inches. ★ *Special sizes of All Fixtures Built to your specification.* 521

Buy More Challenge War Bonds!

THE CHALLENGE MACHINERY CO.
GRAND HAVEN MICHIGAN

PRECISION PARTS

FOR THE LONG GRIND AHEAD IT'S EXPERIENCE THAT COUNTS



. . . intricate brazing-jobs made easy

When the last Jap lays down his gun, American industry will begin settling back to competitive production. No longer will it be production for production's sake. The business will go to those manufacturers who have learned a faster, better way of doing things, and who can apply their war-time lessons to the peace-time years ahead.

Grinding-out small parts by the thousands, yet holding to amazingly close tolerances, is an Ace war-time accomplishment that offers real competitive and performance advantages. Here you will find the experienced operators, the up-to-the-minute machines and equipment, and the responsibility of intelligent management to handle your parts from rough stock to finished piece.

If you have any small parts and assemblies calling for stamping, machining, heat-treating, and grinding, it will pay you to consult with Ace. Send sketch, blueprint, or sample for quotations.

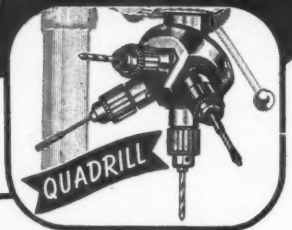
ACE
TRADE MARK

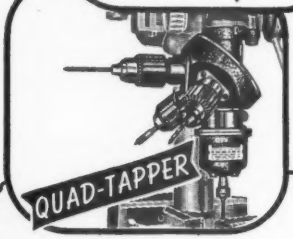
ACE MANUFACTURING CORPORATION
for Precision Parts

ARMY E NAVY

1217 E. ERIE AVENUE, PHILADELPHIA 24, PA.

Here's how you can
DRILL and TAP
4 Times Faster...





★ Your drill presses should be equipped with the QUADRILL 4-position turret attachment. It actually converts a single drill press into FOUR. More than that, it permits hi-speed tapping operations when the self-reversing QUAD-TAPPER (designed only for use with the Quadrill), is attached. The Quadrill and Quad-Tapper combine to form one of the greatest production tools presented to industry in years. In fact... the "blue book" of industry is already heavily represented among our many users.

Speed operations—eliminate costly lost motion moving from press to press. Save hours of time with this new, low-priced, precision-built unit ...the QUADRILL.

AT LEADING JOBBERS EVERYWHERE

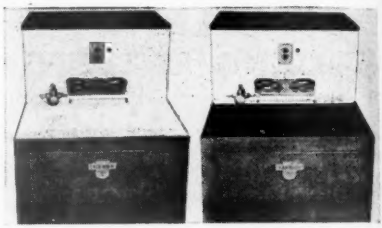
Act at Once — Immediate Deliveries — Write Today!

Guaranteed Satisfaction or Money Back

CHICAGO
DRILLET CORPORATION
919 S. Michigan Ave.
Chicago 5, Illinois

Induction Heating Work Table

A new, single position, general purpose work table, offering optimum flexibility for range of applications used with standard Thermonic Induction generators is announced by Induction Heating Corp., Dept. J, 389 Lafayette St., N. Y. 3, N. Y. A standard Thermonic output



transformer is so mounted as to effect interchangeability from one type transformer to another. For spray quenching, there is a sink with a removable transite cover providing a flat working surface, water piping, a solenoid operated valve and a quench flow regulator for quench time and volume. In the control circuit are two timers; one for the quench period, the other for the delay period from the heating cycle end to start of the quench cycle. The heating cycle timer is located within the Thermonic Induction generator. Transformer output leads, which have interchangeable pressure type fittings for facilitating work coil connection, are supported by mounting brackets on the front panel of the table. Included is a rotating spindle mounted below the work coil and quench ring to provide for work rotation. Interchangeable coils greatly facilitate short run work necessitating numerous changes from one to another type of coil.

INFORM-A-GRAM KEY No. B97-A

★

Aro Equipment Corp., Bryan, Ohio, has received its fourth Army-Navy "E". The firm manufactures high-precision type aircraft products, pneumatic tools, also a new line of lubricators for farm use.

Hammond
OF KALAMAZOO

"Good Machinery Since '82"...

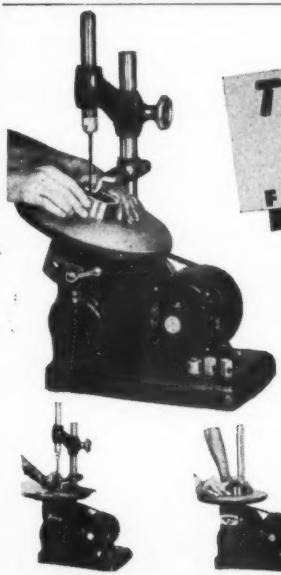
This slogan we try to live up to and improve upon with each passing year. Having come to leadership in our field we strive to maintain our responsibilities through sound progress contributed by a balanced team of younger and older heads.

Our Machinery lines include: Carbide Tool Grinders, Abrasive Belt Grinders, Polishing and Buffing Lathes, Automatic Polishing and Buffing Machines and Cylindrical Finishing Machines. Broadly, these are in the finishing field and you can look to us for up-to-date solutions of your finishing problems.

L. D. Hammond PRESIDENT

Hammond Machinery Builders INC.

1631 DOUGLAS AVENUE - KALAMAZOO 54, MICH.
Eastern Branch: 71 West 23rd St., New York 10, N. Y.



Sawing

Stoning

TRIPLE PURPOSE MACHINE
FILES... SAWS... STONES

ILLINOIS DIE FILING MACHINE

An accurate, smoothly-operating machine that files, saws and stones the most intricate die shapes... eliminates tedious hand operations... reduces costs. It is quality-built for long, trouble-free service... hardened and ground shafts running in bronze bushings minimize wear. The holding chuck and clamping device provide perfect file alignment.

Write for descriptive literature.

ILLINOIS TOOL WORKS
2501 N. Keeler Ave. • Chicago 39, Ill.
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

"10 MILLION PIECES

without a single rejection, thanks to MICRO-CHEK"

-says LUCAS SCREW PRODUCTS, Inc.

Priced from $9.75

Users of nearly 100 Trico MICRO-CHEKS, Lucas Screw Products, Inc., of Rochester, N. Y., reports:

"We find them to be a low-cost economical way of controlling accuracy on high precision automatic screw machine production. In numerous cases, we have reduced our gage cost from 50 to 75 per cent. They check close tolerances . . . eliminating fatigue and uncertainty upon the operator. Their simplicity enables us to use inexperienced help in final inspection. In one case we produced 10,000,000 pieces without a single rejection from the prime contractor."

Speed inspections in YOUR plant with TRICO MICRO-CHEK Comparator Gages, now in use in more than 3600 war plants . . . on machines, on inspection lines. Send for booklet which illustrates many applications.

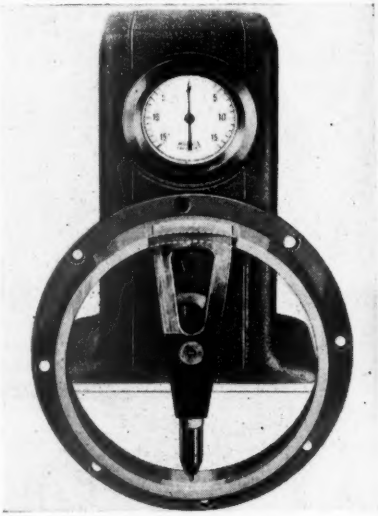
TRICO MICRO-CHEK

TRICO PRODUCTS CORP.

40 Trico Square, Buffalo 3, N. Y.

American Hole Checker

The American Hole Checker, manufactured by The American Gauge Company, Dept. TD, 170 Bayard St., Dayton 1, Ohio, provides a unique and speedy method of gaging the inside diameter of a large bearing housing to very close tolerances. As herewith illustrated, a



special sizing plug was developed, with the upper part of the plug finished to the exact radius of the inside of the bearing housing. The lower part carries the gaging head, which is calibrated for high and low limits of accuracy. The contact point is highly polished norbide which is wear resisting. By using this type sizing plug, work can be checked easily for size, taper and out-of-round condition on large diameters. The Hole Checker unit is air-operated and is set with high and low limit master ring gages. The tolerance is .0005".

INFORM-A-GRAM KEY No. 103-A

• • • •

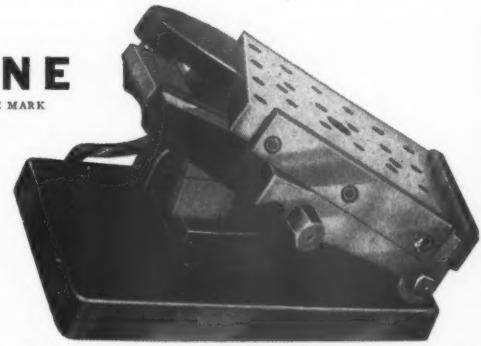
Employees of the Aurora, Illinois, plant of Independent Pneumatic Tool Company, manufacturer of THOR Portable Pneumatic and Electric Tool, have been awarded their fifth Army-Navy "E" production banner.

QUICK, ACCURATE ANGLE SET-UPS

with

ROTO-SINE

TRADE MARK



New method of obtaining both single and compound angles, quickly and accurately with gage blocks. For boring, drilling, machining operations. A dependable precision tool that pays for itself in quality control and increased production.

Available in 5 inch and 10 inch models.
Table sizes—
5" Model A— 5½ x 8
10" Model B— 7 x 12
10" Model C—10½ x 12

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PRODUCTS DIVISION

Select Territories Available for Representatives

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DESIGNERS OF

TOOLS • DIES • GAGES • SPECIAL MACHINES AND PRODUCT DESIGN

410 E. NINE MILE ROAD DETROIT, FERNDALE 20, MICH.

CRITERION *Boring Heads*

Original Accuracy *Maintained*

Noted for maintaining original accuracy over a longer period Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

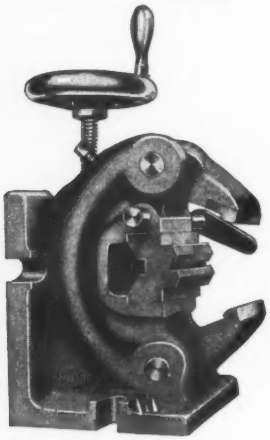
Lead Screw ground from solid AFTER hardening.

CRITERION MACHINE WORKS

BEVERLY HILLS, CALIFORNIA

PRODUCTO

SELF-CENTERING SHAFT VISE



One Vise...

That Every Shop Needs

ou will find a hundred uses for this powerful, ne-saving vise. It holds shafts or spindles — any ameter from 3/8" to 3 1/8" — accurately in position machining slots, splines or keyways.
curate radial cuts are assured by the unchanged ting for all work-diameters. Shafts are always rectly located in V jaw by equal movement of the o clamp-jaws.
n be mounted horizontally or vertically. V jaw hardened and reversible. Base size, 8" x 7¼". ight, approximately 80 lbs.

Write for the Producto Vise Bulletin, "Tools Every Shop Needs".

THE PRODUCTO MACHINE COMPANY

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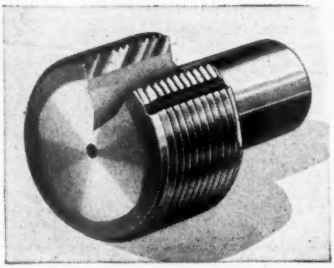
CLEVELAND 4747 Hough Avenue
INDIANAPOLIS 139 West 16th Street
LOS ANGELES 3160 E. Olympic Blvd.
NEW YORK, 197 LAFAYETTE STREET

Chrome-Carbide Alloy Thread Gage Surface

Thread gages with life increased from an average of 20 up to 60 times, by grinding threads in a solid surface of chrome-carbide alloy, are now being manufactured by the George O. Griffin Company, Dept. TJ, 1301 W. Hadley Street, Whittier, California.

This departure from ordinary thread

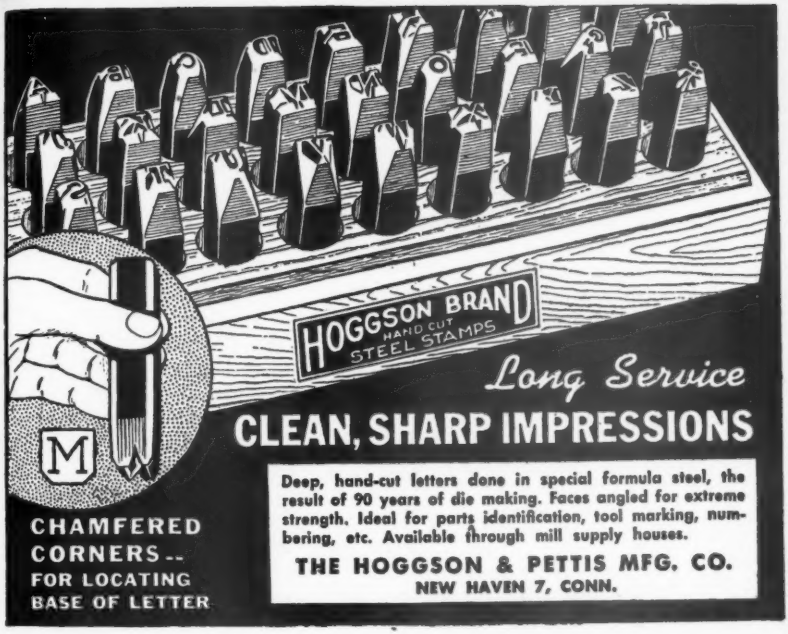


gage manufacture is accomplished by welding a layer of wear resistant, chrome-carbide alloy over the gage blanks, then grinding the threads in the solid deposit. Subsequent diamond lapping of the threads produces gages to exact dimension. The thread, it will be noted from the illustration, is not plated, but is actually composed of solid chrome-carbide alloy which extends well below the root of the thread.

The Griffin process can be applied to reclaiming old gages as well as producing new gages. In reclaiming old gages, the worn threads are first removed, a deposit of chrome-carbide alloy welded over the blank which is then surface ground to correct OD and threaded. This process can be applied to thread plug gages ¼" OD and to ring gages starting at ¾" ID.

Contributing factors to economy in using Griffin gages are: extra life and performance, elimination of rejects because gages have unknowingly worn off-size, reduction of time normally spent inspecting gages. Experience shows weekly checking of gages sufficiently frequent, as against daily checking. A folder describing the process, and quotations on reclaiming old gages or producing new gages is available.

INFORM-A-GRAM KEY No. C9-A



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THE HOGGSON & PETTIS MFG. CO.
NEW HAVEN 7, CONN.

A FLEXIBLE Tapping Machine

handles a wide range of jobs

The Procunier unit here illustrated, by interchanging two tapping heads will handle from a No. 2 tap up to a ⅞" tap in steel, ⅜" in cast iron and ½" in brass and aluminum. That means that in your shops one Procunier can do the work of two or more machines.

In addition, all adjustments can be made quickly and easily—such as regulating compensating spring pressure, setting depth stop, changing to any of the four speeds from 390 to 2050 RPM, or adjusting timing or flow of tap lubricant. Extra long compensating springs assure uniform tapping and reversing pressure independent of operator. Tap establishes its own lead for greater accuracy. Automatic tap lubricator provides abundant supply exactly when needed. Many other features.

PROMPT DELIVERY — SEND FOR BULLETIN

giving full details and prices on Procunier Universal Tapping Machines, High Speed Tapping Head and Tru-Grip Tap Holder.

PROCUNIER SAFETY CHUCK COMPANY

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Procunier Safety Chuck Company
12-14 S. Clinton St., Chicago 6, Ill.

Send me bulletins on: ☐ High Speed Tapping Heads ☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

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	Size	Price Each Net
12"	1/8"	$1.86
	9/64"	1.95
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	11/64"	2.15
	3/16"	2.25
	13/64"	2.34
	7/32"	2.45
	15/64"	2.54
	1/4"	2.63
	17/64"	2.73
	9/32"	2.82
	19/64"	2.93
	5/16"	3.02
	21/64"	3.18
	11/32"	3.36
	23/64"	3.56
	3/8"	3.75
	25/64"	3.95
	13/32"	4.14
	27/64"	4.29
	7/16"	4.49
	29/64"	4.62
12"	15/32"	4.76
	31/64"	4.85
	1/2"	4.88

EASTERN TOOL SUPPLY CO.

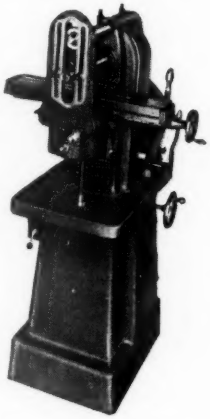
"Tools of Distinction"

176 GRAND STREET
New York 13, N. Y.

SEND FOR OUR CATALOGUE

New Diamond M-26 Milling Machine

A new milling machine is announced by the Diamond Tool Co., Dept. T-4, 3429 East Olympic Blvd., Los Angeles 23, Calif. Known as Model M-26, the new Diamond Mill has increased table travel and table area over Model M-24, which was the largest model made. New



specifications have added 2" to the overall table length and have increased table travel to 15".

Spindle construction of the M-26 incorporates tapered roller bearings and a heat treated alloy steel spindle with ¾" center hole and No. 9 B. & S. taper, hardened and ground for perfect concentricity. All spindle speeds are available continuously through a variable speed drive from 75 rpm to 1200 rpm. One pulley change is necessary between upper and lower speed ranges.

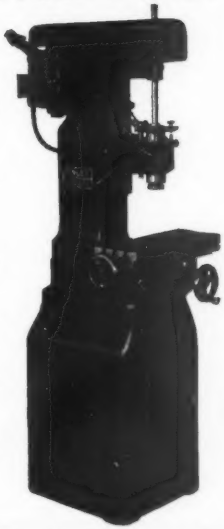
The Diamond Model M-26 is available in both tool room models with power longitudinal feed or production models with rack and pinion table feed. In addition to a full line of milling accessories, gusher type coolant pumps, dividing heads, rotary tables, collets and Diamond Self Centering vises are available.

With the special arbor support illustrated, extreme rigidity is assured between knee, arbor and overarm for heavy cuts in the toughest material.

INFORM-A-GRAM KEY No. 268-A

MICROMETER *directed operation*

FOR FAST, ACCURATE MILLING, JIG BORING



FEATURES

Choice of 8 speeds from 275 to 4250 r.p.m.

•

Velvet feed with direct micrometer setting.

•

Counterbalanced quill to remove backlash during travel.

•

Grease-sealed bearings for smooth operation.

•

Table size 7" x 17½"; floor area 18½" x 20".

•

Table Top to spindle end 11½".

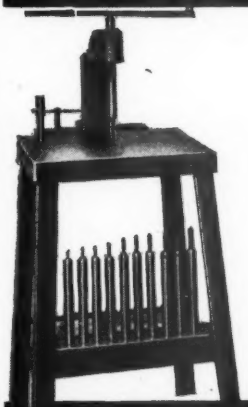
SEND FOR BULLETIN

Within its capacity, the LINLEY can be one of the best money makers in any plant requiring a succession of small jobs such as Die Making, Models, Metal Patterns, Jigs and related operations. It saves larger machines for their rated capacities . . . gets the most from valuable toolmakers' time. Its speed and accuracy keep the decks cleared . . . its design and construction insure smooth operation . . . long life . . . and it takes but 2½ sq. ft. of floor space. Price is moderate . . . returns are generous.

LINLEY

BROTHERS COMPANY
662 STATE STREET EXTENSION
BRIDGEPORT 1, CONN.

A "PAIR" THAT'S HARD TO BEAT



When it comes to savings in time and labor, together with getting better results in the tool room—the combination of the Bay State Hand Tapper and Handy Vise is hard to beat.

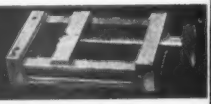
No setting-up—proper spindle ready instantly. Faster, more accurate work with minimum spoilage.

Bay State Handy Vise—useful, accurate, all round precision vise—handles thick or thin pieces for tapping, drilling, grinding or jig boring.

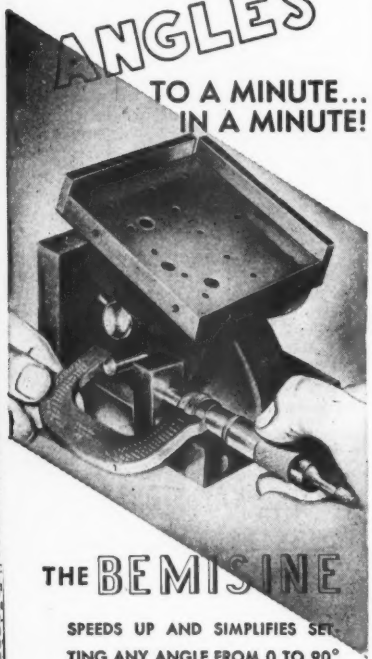
Write for circular. Distributor inquiries invited.

BAY STATE TOOL & MACHINE CO.

DEPT. A 412 ALBANY STREET, SPRINGFIELD, MASSACHUSETTS



The Vita-Var Corp., Newark, have won their second Army-Navy "E" for "meritorious services on the production." Vita-Var Corp. has been devoting the major part of its research and production facilities to products required by our Government and fighting forces.



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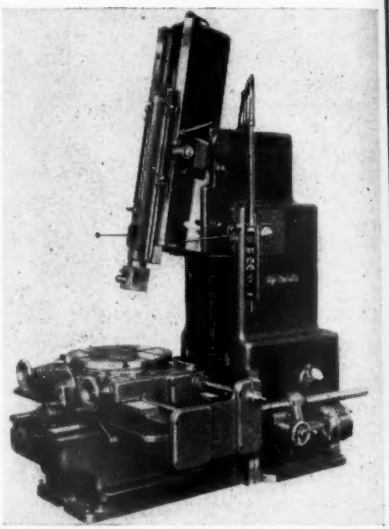
SPEEDS UP AND SIMPLIFIES SETTING ANY ANGLE FROM 0 TO 90° —USING ONLY A 2" MICROMETER!* IT HOLDS THE WORK! FASTER THAN A SINE BAR OR PROTRACTOR! CONVERTS SET-UP TIME TO PRODUCTION TIME ON SURFACE GRINDERS, JIG BORERS AND MILLERS.

*Also Used With Standard Gage Blocks

NICHOLS-MORRIS CORPORATION
44 CHURCH STREET NEW YORK N.Y.

Hydraulic 20" Slotter

The Hy-Draulic Slotter, 20" stroke, is a new development of Rockford Machine Tool Co., Dept. J, 2500 Kishwaukee St., Rockford, Ill. It is similar to the 12" stroke slotter except its column is raised for greater stroke length. Another innovation is the ram stroke-length control dogs being mounted on the side of the ram. Hy-Draulic Slotters are the only



machines of their classification to have hydraulic ram drives and hydraulic feeds. They are equipped with manual and hydraulic longitudinal, transverse and table feeds with power rapid traverse. Micrometer dials, graduated in thousandths of an inch, are of use for longitudinal and transverse feeds and show exact movements of the table which is graduated through 360 degrees. The 20" stroke Hy-Draulic Slotter has a 24" space under the ram guide with an adjustment of 19" in positioning the ram on its hydraulic driver. Both 12" and 20" slotters will slot to the center of a 48" circle and have cutting speeds infinitely variable between 10 fpm and 60 fpm while return speed is 1.67 times the cutting speed. The Hy-Draulic 20" slotter accommodates cutting tools of up to ⅞ by 2".

INFORM-A-GRAM KEY No. E18-A

Increase Production Up to 1000%
NEW—All Quick Change Gear Box

PAYS for Itself in 30 Days!

NEW — IMPROVED MODEL

Sold under 30-day Money-Back Guarantee

GUARANTEED ACCURACY! Is guaranteed to cut accurate threads from 4 to 224 per inch with approximately 3/1000 feed for fine turning. It safeguards entire production in process throughout the complete operation.

DRASTICALLY CUTS LABOR COSTS! No time lost finding gears. Inexperienced workmen easily produce top output. Easy to install. You simply drill and tap four holes.

PRECISION CONSTRUCTED! Precision constructed throughout with gears of quality hobbed steel. Gear Box housing is made of high grade aluminum alloy casting—with replaceable bronze bearings.

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ALL SIZES LEAD SCREWS . . . $12.00 **ALL PRICES F. O. B. LOS ANGELES**

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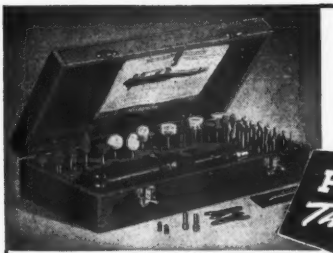

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MORE SPEED
35,000 R.P.M. UNDER LOAD!

PRECISE *Thirty-five*

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Built to outwork the field; packs twice the power and twice the speed of any other electric handtool! Every shop, plant, and maintenance room needs PRECISE 35 for faster, smoother work on steel, non-ferrous metals, plastics, and most other materials. Speeds up to 35,000 r. p. m. under load reduce frictional wear on mounted wheels by as much as 200%.

Fully cased in durable, lightweight plastic and fully guaranteed shockproof without ground wire on AC or DC. For close jobs attach COOLFLEX Flexible Shaft to extend full power and speed to 9 oz. air-cooled hand piece.

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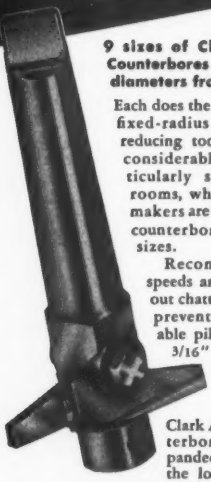


9 sizes of Clark Adjustable Counterbores cut all fractional diameters from ¼" to 5½".

Each does the work of 7 or more fixed-radius cutters, thereby reducing tool inventory costs considerably. They are particularly suitable for tool rooms, where tool and die makers are constantly needing counterbores of different sizes.

Recommended surface speeds are faster, and without chatter. Exclusive, burr-preventing interchangeable pilots available from 3/16" up, by sixteenths.

Clark Adjustable Counterbores are easily expanded. Simply loosen the locking bolts and slide cutting blades in or out. Blades are removable for sharpening.

No de-burring of pilot holes necessary.

Clark Counterbores spot face as well as bore.

Write for bulletin TDJ-7-CB and call your Clark Cutter Jobber today.

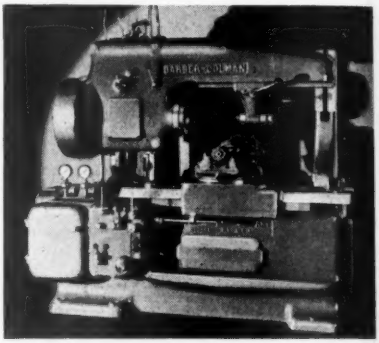
CLARK CUTTERS

Robert H. Clark Company

9330 SANTA MONICA BOULEVARD · BEVERLY HILLS, CALIFORNIA

Barber-Colman Type D Hobbing Machine

The Barber-Colman Type D Hobbing Machine, produced by Barber-Colman Co., Dept. DJ, Rockford, Ill., is designed for heavy duty high production hobbing of spur or helical gears of 3 pitch or finer, in sizes up to 14" diameter, of 14" length. Modern hydraulic principles are used for traversing the hob slide, raising and lowering the work slide, and for clamping machine members. The hydraulically driven feed screw permits variable feeds. Type D's extra ruggedness has frequently made possible the elimination of one cut where two were formerly required and also supplied ample reserve to handle unexpected jobs. Construction design makes it space saving and hardened and ground steel ways of finest obtainable materials assure long-lived, profitable service. Ruggedness of the Type D makes it ideal for climb hobbing provided for by the reversing of feed and rotation controls. The completely automatic machine cycle is controlled by a cycle lever. For ease of machine set-up, additional controls provide individual power operation of various machine movements. The Type D machine's ease of set-up, and its ability to repeat accurately within fractional thousandths of an inch, permit its operator to handle other work simultaneously. Hydraulic holding equipment of use on the machine provides equal tension and minimizes physical effort. Bijur automatic lubrication provides proper lubrication at all times.



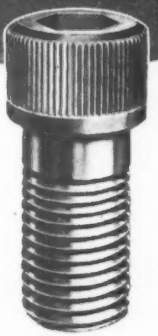
INFORM-A-GRAM KEY No. 201-A

KNURLING

SAVES TIME · TROUBLE · EXPENSE

KNURLED UNBRAKO Socket Head Cap Screw

Reg. U. S. Pat. Off.



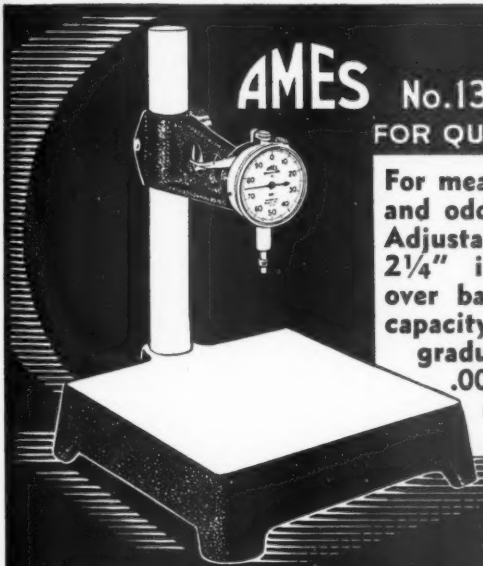
Saves time and trouble because the knurled head affords a slip-proof grip for oily fingers, enabling the screw to be screwed in faster and farther before a wrench is needed. Mechanics *prefer* this unique screw for its greater ease of handling.
If need be, the knurls help to lock the "UNBRAKO" in place.
And because the "UNBRAKO" saves time and trouble, it also saves money — time is money these days.
Sizes from No. 4 to 1½" diameter — full range of lengths. Send for our "UNBRAKO" catalog.

OVER 40 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.
JENKINTOWN, PENNA. BOX 600
BRANCHES — BOSTON · DETROIT · INDIANAPOLIS · CHICAGO · ST. LOUIS · SAN FRANCISCO

Knurling of Socket Screws originated with "Unbrako" years ago.

AMES No. 13 COMPARATOR
FOR QUICK COMPARISONS

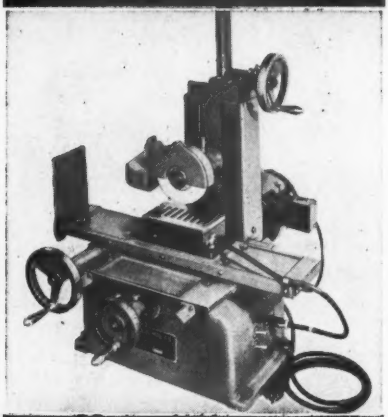


For measuring flat, round and odd-shaped parts. Adjustable bracket holds 2¼" indicator, extends over base 4". Measuring capacity to 6". Indicators graduated in .0001 and .001, with rack spindle up to 1".

Send for Catalog

B. C. AMES CO., WALTHAM, MASS.

SANFORD



High-Speed **BENCH**
SURFACE GRINDER

ACCURATE WITHIN .0001

A sensitive machine built to rigid standards of accuracy and workmanship specially designed *"For the job that fits in your palm."*

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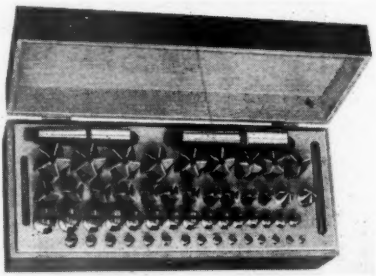
Available On M. R. O. Certifications

SANFORD MFG. CO.
1279-81 Springfield Ave.
Irvington II, N. J.

Gairing C-13 Counterbore Set

Gairing C-13 Counterbore Sets are produced by the Gairing Tool Company, Dept. TD, 21221 Hoover Rd., Detroit 32, Mich. This set makes available two hundred and eighty-one combinations of counterbores, countersinks and pilots interchangeable in tool holders. The Gairing C-13 set shown here consists of: 1 Type C-12 and 1 Type C-13 holder; 20 cutters ranging from $\frac{5}{16}$" to $1\frac{3}{4}$";



28 pilots ranging from $\frac{5}{32}$" to $1\frac{1}{8}$"; 1 countersink, $\frac{7}{8}$" by 70 degrees and 1 countersink, $\frac{7}{8}$" by 82 degrees. The counterbores, pilots and holders selected are the standard sizes most commonly used. Replacements are quickly obtainable from stock. The C-13 Counterbore Set is furnished in a sturdy, compactly arranged box with a hardwood cover. All Gairing Type C-13 counterbore sets are designed for heavy duty work where absolute rigidity, extra strength and perfect alignment are required. The counterbore is held in the holder by friction of the taper shank, aided by the pilot which screws into a floating nut in the holder. The hexagon head of the cutter shank engages a corresponding hexagonal socket in the holder which drives the counterbore.

In addition to the No. C-12 and C-13 sets, two other sets of combinations are manufactured. Type "A", in A-1, A-2 and A-3 combinations has an integral shank and a cylindrical bearing for aligning the cutter concentric with the holder, while type "B", in two combinations, B-2 and B-3, provides for a quick change of tools. Counterbores are securely held and driven by a floating ball whether the tool is idle or operating.

INFORM-A-GRAM KEY No. 800-A

SHOP AIDS

for YOU and YOUR JOB!

Use our postage-free Inform-a-Gram for your requests.

ESTABLISHING AND OPERATING A METAL WORKING SHOP, a 200-page book just released by the Department of Commerce, is the first in a series of authoritative Small Business Manuals prepared by the Bureau of Foreign and Domestic Commerce for the guidance of those who plan to establish enterprises of their own.

The manual was initially prepared at the request of the War Department for use in certain educational activities of the Armed Forces and distribution was limited to men and women on active duty in the service.

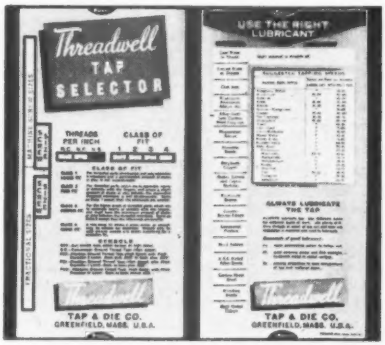
To meet the public interest manifest by the number of inquiries received by the Bureau of Foreign and Domestic Commerce, the series of manuals will be made available for general public distribution through the authorization of the War Department to use the original type and half tones. "Establishing and Operating a Metal Working Shop" is the first of a series which will cover the mechanical, retail and service trades. In preparing the manuals it has been assumed the Veteran, war worker or civilian employee interested in starting his own business is a thoroughly experienced skilled worker, therefore the text covers those factors connected with the choice of location, capital investment, organization of the business, credits and collections, record keeping, etc.

Copies of the manual may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price 35 cents each.

MACHINE DRAWING, A Text and Problem Book for Technical Students and Draftsmen by Carl L. Svensen, B. S., M. E., LL.D. Machine drawing has come to occupy an extremely important place in the engineering and manufacturing world. The complexity and variety of materials, operations, and processes is such that a course in mechanical or engineering drawing will no longer suffice as adequate preparation. The purpose of this Third Edition with its revisions is to bring the text up to date, to include new material, and to add a large number of new problems. The text has been rewritten where improvements could be made, but features of proven value in former editions have been retained. Changes throughout the text are such as to improve the value of the book for both teaching and reference purposes.

The subject matter is given in thirteen chapters covered by 270 pages. The book is 6" x 9¼" and cloth bound. Publisher: D. Van Nostrand Co., Inc., Dept. DJ, 250 Fourth Ave., New York 3, N. Y.

THREADWELL TAP SELECTOR. You can select at a glance the right tap for the job, the right lubricant and the right tapping speed with this new vest-pocket size "slide-rule" indicator. A simple setting gives the style of tap on one side; on the other side are found the suggested speed and lubricant.



The device is sturdily made of soil-proof celluloid. It is offered free of charge to readers of TOOL & DIE JOURNAL through Threadwell distributors and may be obtained by writing Threadwell Tap & Die Company, Dept. TD, Greenfield, Mass., or using *INFORM-A-GRAM KEY No. 70-A*

SHOP AIDS

COATED ABRASIVES. by E. G. Gallaher, M. E., Consulting Abrasive Engineer, is a handbook and digest of Coated Abrasive Technology.

The handbook is definitely prepared for the enlightenment of the customer of the coated abrasive industry. There are thirty-six pages giving the sources, preparation and characteristics of the abrasives, kind and preparation of the backings, adhesives, and the methods of manufacture.

Abrasives are divided into two classifications; technical and non-technical. Flint and Emery are in the "non-technical" class and are so classed because they are sold only in sheet form and used for hand operations such as finishing and polishing. Silicon carbide, aluminum oxide and garnet are considered "technical" because abrasives employing these materials are actual production tools and must deliver definite work value when employed on sanding machines.

Coated abrasives are marketed under various trade names. A list of the most common trade names, with the name of the abrasive used, is given in this handbook.

Copies of this handbook may be obtained without charge by writing to the publishers, Clover Mfg. Co., Dept. TJ, Norwalk, Conn.
INFORM-A-GRAM KEY No. E34-A

THE MANUFACTURE OF DIES, a new Allegheny Ludlum Steel Corporation 16mm sound and color film, running time 10 minutes, is announced by the company, and is available for use upon request. It describes the manufacture of lamination dies from Huron, High Carbon-High Chromium die steel. The new film supplements others already available covering stainless, tool, and electrical steels. Address Allegheny Ludlum Steel Corporation, Brackenridge, Pa.

BROACHING AND BROACH SHARPENING are operations covered in Bulletin No. 942 issued by Colonial Broach Company, Box 37, Dept. DJ, Harper Station, Detroit 13, Michigan. The booklet contains two articles: (1) Broaches and Broaching, and (2) Resharpening Broaches to Obtain Longer Life, prepared by Harry Gotberg, Chief Engineer.

The first is in the form of queries and answers based upon actual inquiries from broach users. The answers will be found helpful in solving many of the problems involved in applying the broaching process to greatest advantage in increasing production, and obtaining greater accuracy in manufacture.

Instructions on resharpening broaches, in the second part, covers the correct methods of sharpening and handling broaches to obtain longest useful life from these important necessities to successful broaching. Tooth angles, proper sharpening procedure, sharpening equipment and suggested checking methods are described.

In addition to Bulletin No. 942 a four-page folder is available entitled "Broaching Do's and Dont's." It contains answers to the most frequently asked questions with regard to correct broach use, and is designed for wall mounting.
INFORM-A-GRAM KEY No. 26-A

4 WAYS TO SALVAGE, RECLAIM AND CONSERVE IRON CASTINGS by Electric Arc Welding is described in a bulletin issued by C. E. Phillips & Co. The subject matter treats the methods and procedures for saving damaged cast iron parts from the scrap pile.

Broken cast iron gears and cracked transmission housings can be successfully welded and machined according to the instructions given, also defects in castings, worn castings and change in design can be corrected by welding repair.

Phillips Crucible Arc No. 600 Electrodes used for cast iron welding produce a deposit on the parent metal identical in color and machinability.

This bulletin may be obtained by addressing C. E. Phillips & Company, Dept T, 2750 Poplar Street, Detroit 8, Michigan.
INFORM-A-GRAM KEY No. A24-A

CONSERVATION and SALVAGE of TOOLS and GAGES. The Hartford Manual is a preparation of Hartford Chapter of the American Society of Tool Engineers, Inc. It is published to present various methods of designing, salvaging and reclaiming worn out or broken tools and gages and is arranged in non-technical language from proved records of modern shop practice. Tools are being reclaimed for long, useful life by simple economical methods which can be set up in almost any shop and at comparatively small cost. There is a limit, however, to the extent to which the work can be performed and to which it is profitable to go. The purpose of the manual is to record the ways for doing this work and to point out limitations. Gages that are worn beyond dependable usefulness can be restored to a condition rivaling their original appearance and life-expectancies. The economic advantages and possibilities are even greater than for cutting tools, yet there remain definite handicaps and hazards to be considered. This book is an attempt to explain ways of gage reconditioning which have also been proved in practice and are worthy of adoption in production manufacturing. The Hartford Manual may be ordered directly from American Society of Tool Engineers, Inc., 1666 Penobscot Bldg., Detroit 26, Mich., at 75 cents per copy.

FORD MOTOR COMPANY ANNOUNCES

a new 1945 GAGE BLOCK and ACCESSORY CATALOG

Complete—all standard English and Metric Sets, individual standard and special blocks, accessories, with illustrations of scores of precision measurement methods proved in toolroom, laboratory and on the production line.

ADDRESS: Ford Motor Company, Johansson Division, Dept. 157, Dearborn, Michigan.

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Every toolroom and standards-laboratory should have a copy! Every mechanic or technician who works to precision measurements should be familiar with famous "Jo-Blocks," the genuine millionth-inch marvels invented by Carl Edvard Johansson and made in America by Ford.

Ford

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GAGE BLOCKS

SHOP AIDS

FRICTION SAWING. When a band saw travels at a rate of speed that carries almost a million and a half teeth a minute through the kerf, 24,000 active teeth a second, with the spaces between the teeth carrying oxygen-rich air into the cut and with sufficient pressure applied to the blade to maintain a burning flame, that's Friction Sawing. Arthur A. Schwartz, Chief Tool Research Engineer of Bell Aircraft Corporation, author of a most interesting and instructive book on the subject, says this method of cutting or burring materials is not an invention or anything new but merely a revival of an almost forgotten technique. In any case, this book, published by the Tannewitz Works, Grand Rapids 4, Michigan, which is available to TOOL & DIE JOURNAL readers merely for the asking, describes a fast, accurate method of cutting or trimming to shape a wide variety of materials including armor plate steel, boiler plate, stainless steel, alloy steels, fully hardened tool steels, non-ferrous metals, tough plastics and many others. In certain jobs friction sawing has many advantages, such as its ability to remain straight under all conditions without tendency to run out, or to go from one metal to another or to glass or any other material and continue cutting without hesitation. It will handle material of almost any thickness, making a slanting cut throughout if desired, with nearly perfect scarfing.

INFORM-A-GRAM KEY No. 684-A

AIRCRAFT SHEET METAL BLUEPRINT READING, by Coxen, Jackson and Masters, is a "How-to-do-it" book that is ideal for beginners with no previous experience, as well as for those who are experienced and who want additional training. The authors have avoided the temptation to teach the reader how to draw and, instead, have concentrated on teaching blueprint reading in simple non-technical language, based on their actual experience in training thousands to read blueprints easily and efficiently without the necessity of mastering drawing. This volume contains true and false tests and actual blue-on-white and black-on-white prints ranging in size from 8½" x 10¾" to 21¾" x 31¾". Adjoining each print is a sheet on which is printed a series of questions with spaces for answers; these sheets may be readily removed from the text without harming the book. Extra sets of these questions can be purchased and thus the textbook itself can be used again. The reader-student learns blueprint reading by actually reading blueprints such as he will encounter on the job, and he is tested to make sure he has mastered each step before proceeding to the next higher step or more difficult blueprint. This plan of instruction will help greatly in cutting the training time necessary to turn out proficient blueprint readers. Published by the American Technical Society, Dept. J, Drexel Ave. at 58th St., Chicago 37, Ill. Priced at $2.50, extra set of questions 50 cents.

"SCIENCE OF MEASUREMENTS", a new home study educational feature has been announced by DoALL. Feeling that wider knowledge of precision measurement will aid industry in cutting costs and increasing production, this company has prepared a group of eight lessons for individual and vocational gage training programs.

Nothing connected with precision measurement has been overlooked. The lessons amply illustrate the care and use of gage blocks; many concrete examples are given along with photographs showing how their use may be expanded. How they may be utilized as direct working gages in conjunction with gage holders and instruments.

Hundreds of photographs show inspection and engineering methods utilizing height gages, locating gages, go—no-go gages, inside and outside micrometers, lead screw measuring gages, scribers, dividers and the new mobile inspection unit.

Tables and formulas make simple such problems as measuring pitch diameter of screws, splines and helical gears by the three wire method, and measuring of angles, bevels and tapers by use of the sine bar.

A full booklet is devoted to the Comparator, showing the complete versatility of this instrument as a machine and its endless inspection possibilities when used with fixtures.

The chapter on light wave measurement makes clear, in language even a layman can understand, how simple this basic measuring means is, and how by use of the monochromatic light and optical flats, measurements of flatness, parallelism, length, roundness and so on may be made direct with ease and certainty.

Clearly and concisely written with complete data, questions and answers, this course should give even a novice a working knowledge of precision measurements. It will be of particular value to plant inspection departments checking new ways to establish quality control over their products.

The whole eight lessons shown in photograph are spaced to cover a two month period. Mailings are made direct to the homes of inspection personnel on the basis of one lesson each week.

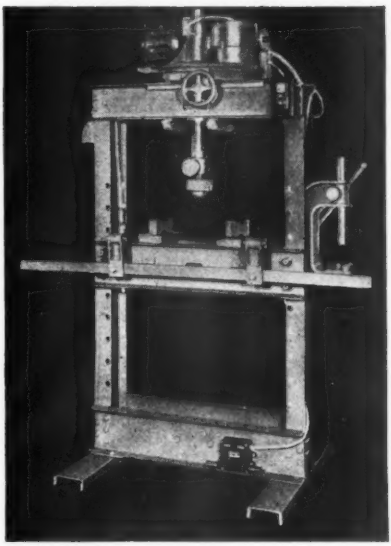
Detailed information on how these lessons may be obtained can be secured by addressing Continental Machines, Inc., Dept. TJ, 1303 Washington Ave., S., Minneapolis 4, Minn.

INFORM-A-GRAM KEY No. 696-A

even the Inexperienced

are SKILLFUL with

AUTOMATIC PRESSURE CONTROL



PRESSUREMATIC

POWER PRESSES

You may set a PRESSUREMATIC so the ram stops or backs off the work at any pre-determined pressure. Foot-pedal controls enable operator to use both hands. It's the ideal press for production runs because you can duplicate work pressures exactly. Develops 60 ton pressure in 4 seconds! For bending, straightening, assembling, disassembling, press-fits, and many other tool-room or production operations. Good delivery.

20, 40, 60 TON ELECTRIC AND HYDRAULIC MODELS

$215 TO $1398

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BURKE

MILLING MACHINES

No. 4 Motor Driven MILLING MACHINE Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

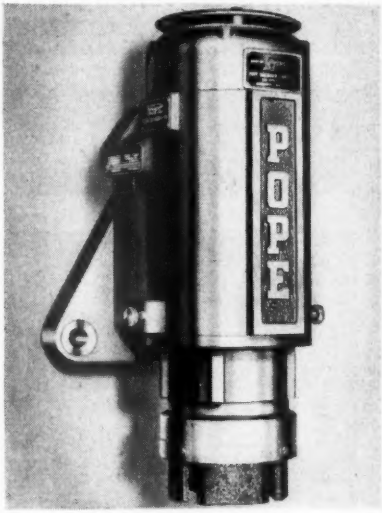
Write for complete information.

Burke Machine Tool Co.

301 E. 16th St. -:- Conneaut, Ohio

Pope Precision Spindle

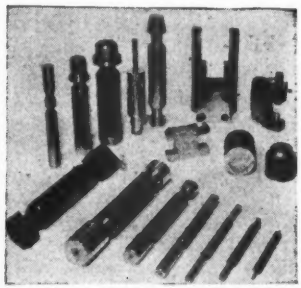
This vertical precision spindle for use on surface grinders and for other purposes has been developed by Pope Machinery Corp., Dept. DJ, Haverhill, Mass. It is equipped with fan cooled, totally enclosed, 3, 5, 7½, or 10 hp motor and may operate at 600, 750, 900, 1200,



1800 or 3600 rpm on 60 cycle AC current. Even higher speeds are attainable with frequency changes. With other Pope precision spindles, this one features sealed lubrication and no oil cups, wicks or grease fittings which demand periodical attention. The sealed-in lubricant increases bearing life. No dust and dirt can enter and damage the super-precision bearings, which in this spindle assure high speed production and fine finishing. The coolant is fed down through the hollow spindle, cooling motor and bearings on its course to the inside of the cup wheel where it is most effective. Specializing in the design and construction of precision spindles, Pope Machinery Corporation has developed an extensive range of sealed lubrication spindles for tool and cutter grinding, surface, internal, and special ball race and bearing grinding, and headstock and live tailstock spindles.

INFORM-A-GRAM KEY No. 741-A

QUICK DELIVERIES
FOR
New Products
AND
Reconversion



New Gauges

Worn Gauges Salvaged

Obsolete and Redesigned Gauges Reworked

•

OWN HARD CHROME PLATING PLANT

•

Plain Plug, Ring — Taper — Progressive, Wire type — Flush Pins — Flat, Solid and Built up Snaps.

Adjustable Limit Snap Gauges.

Thread Plug and Ring Gauges.

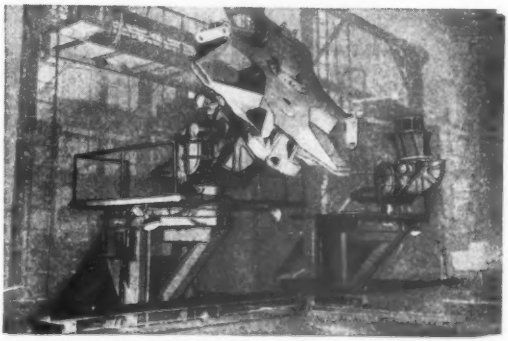
Special Gauges, Small Fixtures.

MIDDLESEX
GAUGE AND TOOL CORPORATION
526 W. 48th St., New York 19, N. Y.

Quotations and Literature on Request

PRODUCTION SET-UP LIKE THIS

forecasts
a new
"Shop Practice"

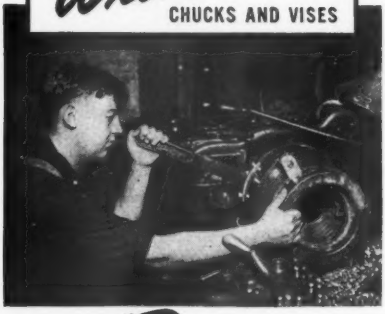


By *welding* on C-F Positioners, some manufacturers far out-produced all estimates of "possible War Production". Not only did this method increase output, it saved material and increased strength and quality while lowering the cost per unit. Under post-war competition automatic welding on C-F Positioners is certain to become standard manufacturing practice for many products. It is a new method that permits down-hand welding of all sides and angles from a single set-up. A method you should know and understand.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO. 1316 S. KILBOURN AVE. CHICAGO 23, ILL.

THOMAS-BARKER
Wrenchless
CHUCKS AND VISES



Save Time—
PRODUCE MORE!
Easily Installed—
No Accessories Required

Thomas - Barker Wrenchless chucks are made in 3-jaw (shown above) and 2-jaw types.

• Output by turrets, engine lathes, pipe threading machines, cutting off machines, drill presses, and other types of chucking machines, is greatly increased by the use of Thomas - Barker Wrenchless Chucks and Vises.

A pull on the lever grips the piece part with great power—a push on the lever releases the part. For many parts made on turrets, engine lathes, etc., it is unnecessary to stop the machine to set the work. The cycle of operation is simple and fast—reducing machine waiting time to the minimum.

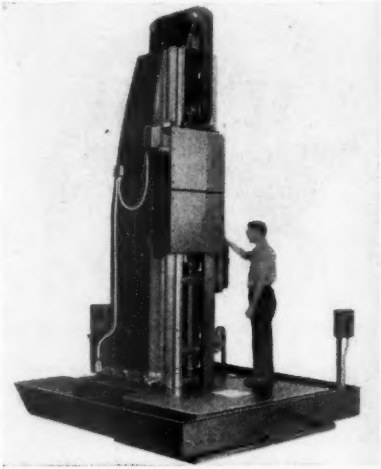
Thomas - Barker Wrenchless vises are available in 3-jaw (shown below) and 2-jaw types.

Write today for new descriptive bulletin No. 201

THOMAS HOIST CO.
Chuck Division
20 So. Hoyne Ave., Chicago 12, Ill.

Vertical Drilling, Boring and Facing Machine

A basic machine for drilling, boring and facing that can be tooled and adapted to many types of high speed production jobs requiring up to 60 hp and 50,000 lbs thrust is the 924 Vertical, made by the W. F. and John Barnes Company, Dept. D, Rockford, Ill. The design and construction features of this



machine make it highly suitable for mass production drilling, boring, facing, and reaming, especially on jobs requiring wide area heads. For heavy facing work, unusually slow feeds are obtainable by simple adjustment on the hydraulic unit which is mounted on the column side. The heavy, cored column casting with 24" ways carries the head saddle and head which are counterbalanced by easily accessible weights. The control bar with adjustable dogs for governing the head travel and the way lubricator are united on the head saddle. Illustrated in the W. F. and John Barnes Company's pamphlet, descriptive of numerous 924 Vertical models, may be found machines capable of performing multiple operations, designed to handle limitless numbers of parts having large or complicated form and of use for materials as heavy as cast armor plate.

INFORM-A-GRAM KEY No. 80-A

KALAMAZOO *Metal Cutting* **Band Saw**

The most practical, convenient and efficient equipment for HIGH SPEED PRODUCTION in cutting off metal to lengths. Handles solids, tubes and all metals.

Compact coolant attachment eliminates messy floor pans, does not interfere with operation of machine and enclosed saw frame prevents all splash or drip on back travel. High grade pumping unit assures uninterrupted service and has ample capacity for any job.

Supplied without coolant for intermittent cutting. Portable—plugs in anywhere. Two sizes—8″ x 16″ and 8″ x 24″.

First choice of efficiency engineers. Ask your dealer or write for bulletin.

MACHINE TOOL DIVISION ★ KALAMAZOO TANK & SILO COMPANY
KALAMAZOO 16, MICHIGAN

In Canada — BRIDGE MACHINERY COMPANY, MONTREAL

ENGINEERED TO THE JOB AND...

*Mastercased

TO GIVE UP TO 500% LONGER LIFE

*MASTERCASTING . . . that's our improved super-heat-treating process which adds to the life of Masterform cutting tools . . . will multiply your production . . . will divide your costs per cut.

Want proof? Write, wire or phone for name of nearest-to-you factory representative . . . or without the slightest obligation, send specifications for estimates and complete information.

MASTERFORM

*Mastercased CUTTING TOOLS

Meet the Challenge

MASTERFORM TOOL CO.

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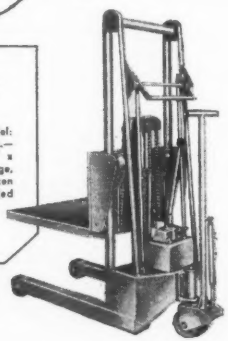
OUTSTANDING ENGINEERING SERVICE AND CRAFTSMANSHIP

LYON-Raymond
Hydraulic Elevating Tables
AND
Hydraulic High-Lift Trucks

Solve MANY HANDLING PROBLEMS . . .

Either of these modern pieces of equipment will pay for itself within a short time. One often supplements the other. Deliveries from stock. Write for literature and prices.

HYDRAULIC ELEVATING TABLE
Standard Stock Model: Capacity 2,000 lbs. — Table size 30" x 30". Elevating range, from 29" to 43". Available with casters or feet.

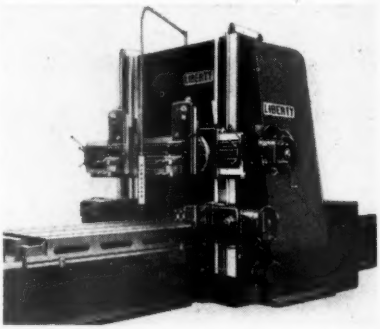


HYDRAULIC HIGH LIFT TRUCK
Standard Stock Model: Capacity, 1,000 lbs.—Platform size, 24" x 30". Elevating range, from 6" to 48". Timken equipped — welded fabrication.

LYON-Raymond Corporation
436 Madison St., Greene, N. Y.
Material Handling Equipment
Engineered Hydraulic Devices

Liberty New Design Planers

Planers of new design are being built by Liberty Planers, Inc., Dept. TD, Hamilton, Ohio, in sizes including 36" up to 120" in double housing and from 36" up to and including 96" in openside models. Cutting and return speeds available are from 4 to 5 fpm up to 240 fpm. On a 60" planer here illustrated, the side head will cut 60" without tool or slide resetting and without interfer-



ence with the rail at its maximum height. Feed and rapid traverse of the heads are performed through a friction safety device for preventing any machine damage by colliding heads. The side head, which is an independent unit, is individually motor operated for vertical rapid traverse and feed. The same motor powers the horizontal travel of the tool slides for in-feed. Parallelism of side heads and rail head, while cutting simultaneously with all tools on the same plane, eliminates cut lengthening. Tools set in front of the bull wheel, pull instead of push the cut into the tool. Rail heads of the machine are offset toward the center, providing a minimum distance for the tool when cuts close together are required. The side heads are offset toward the top to provide close range for the tool underneath the cross rail. Rail and side heads are electrically controlled. Dual control levers are provided on right and left sides of the machine. Force feed lubrication to bed and table V's is supplied by an individual motorized pump.

INFORM-A-GRAM KEY No. 366-A

CADILLAC GLASS SURFACE PLATES

Afford Unique Advantages.
Priced from $11 to $90. Write for folder.

CADILLAC GLASS CO.
900 WEST CERMAK ROAD
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TWO MACHINES IN ONE!

For Die-Filing Use Top Table in Position Shown.

For Punch or Blind-Hole Filing Tilt Top Table Back, Use Lower Table.

DIE TABLE Filing From Below

PUNCH TABLE Filing From Above

No more hand filing of intricate jobs or inaccessible parts! With this Duplex Die and Punch Filing machine you can take care of all filing and lapping jobs as they come along. Stroke fully adjustable from 0 to 1½". Two Speeds. Fully enclosed motor. Ball Bearings throughout. No dripping of oil. No waste of unused file sections.

Write for Descriptive Circular.

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IDEAL TOOL and DIE CO., INC. - 735 CONGRESS STREET SCHENECTADY, N. Y.

Use Them Over and Over

DE-STA-CO ARBOR SPACERS

Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for $1.00. Give arbor size.

Size and price list sent FREE!

DETROIT STAMPING CO.
Established Over 25 Years
344 Midland Ave • Detroit 3, Mich.

H & G Spectifier

This practical device introduced by The Eastern Machine Screw Corp., Dept. T, New Haven, Conn., produces a reliable, convenient and high speed means for the inspection of screw machine parts and similar work of up to approximately 3" in diameter. A specially selected lens provides focus on both large and small

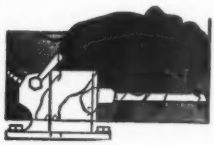
areas of flat and curved planes. With the wide diameter lens both eyes can be used for critical inspection from all angles and at casual distances from the lens. The SPECtifier's light source gives a highly efficient and uniform degree of light, an important factor in standardizing on an inspection method and in overcoming objectionable variations to be found when inspecting under different degrees of artificial or natural light such as is found on dark days as contrasted with bright days. This combination of uniform lighting and magnification overcomes the variances which occur when several men each use a differently powered inspection lens or none at all. The H & G SPECtifier has no focusing devices and no holders are required for material being inspected. The streamline design permits work to be passed rapidly under the glass, speeding up inspection and assuring uniform quality of finished work. SPECtifiers are regularly supplied with 25 W lamp for 115 to 120 V.

INFORM-A-GRAM KEY No. 210-A

Announcing

MEAD MIDGET AIR CLAMPS

Horizontal and Vertical!



Both models deliver 80 lbs. pressure on a line pressure of 100 lbs. They'll save countless man-hours in assembly operations involving welding, riveting, bolting, etc. *Advantages over mechanical clamps:* 1. Any number can be operated by single master valve. 2. Easily installed in cramped corners. 3. Equal ram pressure at any stroke point. Send for new Mead AIR POWER Catalog, describing our line of Air Clamps, Air Vises, Air Presses, Work Feeders, Valves, Controls, etc.

MEAD SPECIALTIES COMPANY

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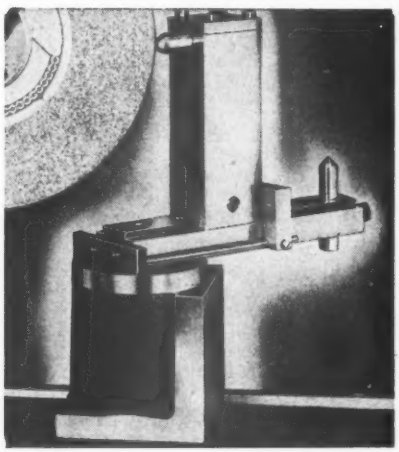
THE "FORM-MASTER"

ANGLE & RADIUS DRESSER

A sturdy, quality instrument designed by form-grinding specialists to dress both angles and radius at low cost. Two 1/3 ct. diamonds and instrument case included—$150.00 complete.



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Large range.
Chatterless and dustproof.
.0001" accuracy obtainable.
Simple to operate.
Reasonably priced.

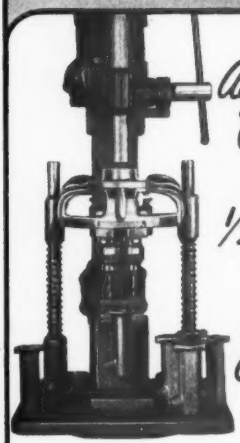
Call your supplier or write

J. & S. TOOL CO.

477 MAIN ST. E. ORANGE 4, N. J.

TWO SPINDLE *Adjustable* DRILL HEADS

Drill Two Holes At Once



✓ *Adjustable Centers from 1/2" to 6"*

✓ *Drill Capacity 0 to 5/8"*

Sleeve and overarm types ... in several sizes. Will double output of any single spindle drill press.

Quickly adjusted to desired drill centers from 1/2" to 6".

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LINDERME

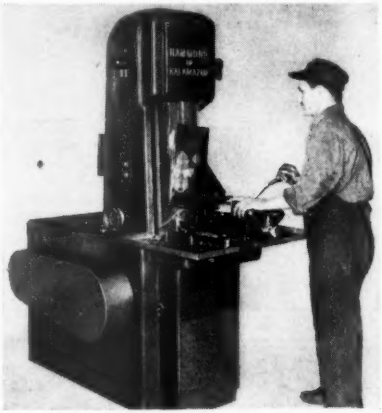
MACHINE & TOOL CO., INC.

12250 COYLE AVENUE

DETROIT 27, MICHIGAN

Hammond Belt Grinder

The V-10 Abrasive Belt Grinder announced by Hammond Machinery Builders, Inc., Dept. T, 1631 Douglas Ave., Kalamazoo 54, Mich., weighing over a ton, will surface and finish any grindable material. Model V-10 finishes faster and better many jobs usually requiring shapers, milling machines, surface grinders, disc grinders, etc. This grinder does deburring, descaling, chamfering, beveling and finishing of pads,



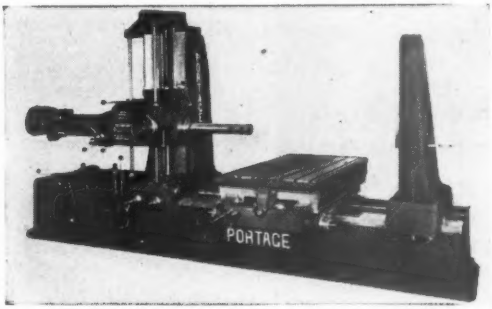
bosses and thin sections of castings, forgings, stampings, etc. The abrasive belt operates to the edge of the belt back plate where clearance provides access to corners. The V-10 accommodates various types of tables with unlimited choice of fixtures for holding many shapes and sizes of work. Standard equipment includes either an oscillating or a plain table. The oscillating table has a micrometer stop graduated in .001" for accurately regulating the grind depth, 3 T slots and single handle control for both work feeding and oscillating. The idler pulley is mounted on a heavy column incorporating a built-in automatic device for tightening belt stretch and providing vibrationless operation. A large capacity coolant tank with adequate, outside controls is located in the machine base. For dry operation, a connection for exhaust replaces the coolant unit.

INFORM-A-GRAM KEY No. 95-A

PORTAGE

4 INCH BAR HORIZONTAL BORING, DRILLING & MILLING MACHINE

ROTARY TABLES



ACCESSORIES

- Designed and built to meet the need for speed and accuracy demanded of today's production.

WRITE TODAY for fully illustrated bulletin giving detailed description of the many features of this Horizontal Boring, Drilling and Milling Machine. No obligation.

THE PORTAGE MACHINE COMPANY
555 Miami Street, Akron 11, Ohio

BOYAR-SCHULTZ SMB MACHINE BOLTS
SAVE the Machine - SAVE the Job - SAVE Time

Heat treated alloy steels make them T,O¦U G H for heavy work; machined heads and carefully cut threads make them A C C U R A T E for the most exacting tool room work. Heads are machined square with bodies, presenting a clean, flat surface to the T-Slot. Work is held tightly under heavy machine cuts. Close adjustments are possible.

Avoid worn or poorly made bolts. They can cause costly damage to machine beds, ruining the machine's accuracy.

For best results, use SMB Nuts and Washers. They are specially made for use with SMB Bolts.

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BOYAR-SCHULTZ CORPORATION
2112 Walnut Street **CHICAGO 12, ILLINOIS**

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2300° F. in 30 Minutes with this Efficient, Low-Cost Heat-Treating Furnace

JOHNSON No. 120

1500° F. in 5 Minutes!

A low-cost unit that is unexcelled for heat-treating high-speed steels . . . for hardening any steel dies, punches, tools or small metal parts. Gets the job done before conventional-type furnace heats up. Remarkably economical to operate. Firebox 5 x 7¾ x 13½ lined with high temperature insulating refractory. Temperatures easily regulated. Complete with Carbofrax hearth, G.E. Motor and Johnson Blower.

$129.50

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Speed up your Heat-Treating Operations with Johnson Units. Order your furnaces TODAY!

FREE Use Coupon — Write for catalog showing all Quick Acting Johnson Furnaces for high-speed steel and other heat-treating purposes.

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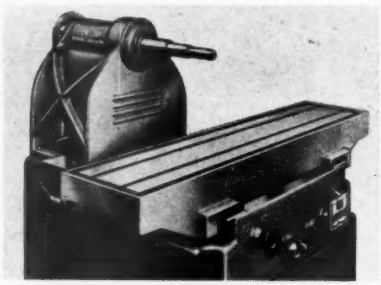
Precision Boring Machine

This bench type Precision Boring Machine, made by Century Engineering Co., Dept. T, 5529 S. Vermont St., Los Angeles 37, Cal., is useful for many types of jobs or for special application in single purpose work. The table's longest dimension crosses the spindle axis to accommodate the majority of parts which require bored holes at right angles to the greatest length. With a working surface of 6¼" by 33½", the table is of ample size to hold big fixtures. It is



provided with 2 T slots, each $\frac{11}{16}$" wide, and a coolant trough around the outer edge. The table moves on dovetailed ways having an automatic oiling system. The centerline of the spindle is 6⅝" above the table. It is built to maintain its rigidity, and has four preloaded, precision ball bearings, a No. 5 Morse taper and is driven by means of a three step pulley at 650, 1300, and 2450 rpm when 60 cycle current is used. The ⅓ hp 110 V motor is mounted on a hinged plate which maintains proper tension on the V belt and simplifies belt shifting. The proven design, air-hydraulic feed mechanism is simply and easily operated. Boring feeds are variable through a wide range and are accurately controlled by an unusually designed metering valve. Another valve can be supplied to control return movement of the table so the forward stroke can be used for a semi-finish cut, the return stroke for finishing. The feed mechanism operates on 90 to 125 lbs of air. The spindle is parallel within less than .0005 per 8" to the ways.

INFORM-A-GRAM KEY No. E19-A

Use this *precision* INDEXING HEAD on ANY Tool or Surface Grinder!

Holds straight shank tools up to 1″ diameter in standard collets (Type 1-AM). Quill is ground to hold No. 4 Morse Taper tools. With conversion sleeve (furnished) holds tools up to No. 9 B & S Taper. Graduated 360° in 3 planes. Prompt delivery.

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INCORPORATED
Successors to
CLEVELAND TOOL ENGINEERING CO
1261-M West 4th St. Cleveland 13, Ohio

Now! YOU CAN HAVE YOUR GAUGES MADE FROM THE Longer-Wearing TANTUNG

Tested and proven—tested under the most rugged conditions—proven beyond a doubt that it has up to twice and even more wear resistance than other non-ferrous cast alloys—and at no higher cost. Quotation on request.

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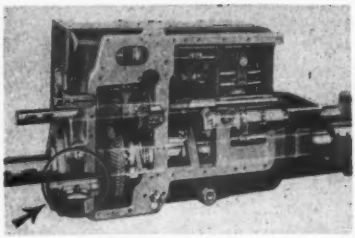
MAKE
MACHINE
BEARINGS



OF
TOOL STEEL
TUBING

Machines can be improved and their manufacturing cost reduced by use of tool steel tubing. The milling machine headstock shown above has had its efficiency increased by a main spindle sleeve bearing (lower left) made of tool steel tubing.

FREE DATA ON
TOOL STEEL TUBING
APPLICATIONS

WRITE TODAY
for your FREE copy

IMMEDIATE SHIPMENT FROM STOCK

Carbon and Alloy Steels, H.R. and C.D. • Ball Bearing Steel • Aircraft Steels • Boiler Tubes Chisels • Cold Finished Steels • Cumberland Ground Shafts • Drill Rod • High Speed Tool Bits • Shim Steel • Spring Steels • Tool Steels Tool Steel Tubing • Welding Rod

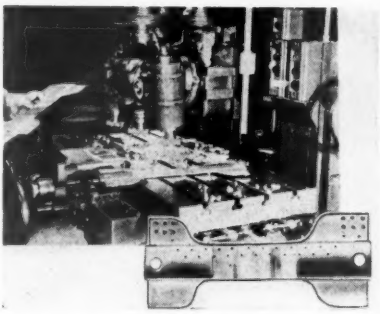
BISCO

THE BISSETT STEEL CO.

945 EAST 67th ST., CLEVELAND 8, OHIO

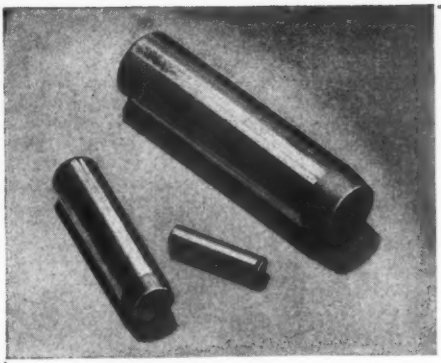
Multiple Machining of Aluminum and Magnesium

Recently developed by the Aircraft Products Mfg. Co., Dept. J, of Des Plaines, and Wauconda, Ill., is a new production technique for rapid, accurate machining of aluminum and magnesium. On the illustrated aluminum casting, elimination of 2 set-ups, 2 milling fixtures, and reduction of 12" in table travel distance and 2 handlings was ac-



complished with substantial saving in costs. Part runs of from 100 to 10,000 pieces or more, both simple and intricate, can be readily processed. The Hack Machine Co., through development and building of a battery of special machines, with versatile, specialized, interchangeable attachments, eliminates many tools and fixtures usually needed with saving of up to 50% or more. On aluminum and magnesium parts, a sequence of operations like surfacing, boring, milling and drilling can be executed at one setting. Special machines built by Hack permit the simultaneous mounting of 4 heads on a master work head, thus providing for multiple production of up to 4 pieces at once. With machine set-up and coordination of special combinations of work heads by means of Verniers built in the machines, the part can be precisely positioned, in relation to the cutting tools, in all directions. This provides jig borer precision between related surfaces whether drilled, slotted or milled, eliminating inaccuracies caused by transfer of parts from one jig to another.

INFORM-A-GRAM KEY No. E17-A



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STANDARD
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DOWEL PINS

While commonly used in punch and die work, our Dowel Pins are also serving as locating pins and for many newly recognized purposes of convenience in machine assembly. Surfaces are precision-ground to a tolerance of plus or minus .0001" and treated with rust preventive. Our standard pins are ground .0002" over listed diameters; oversize pins are ground .001" over listed diameters. Special oversize pins are ground .002" over listed diameters. Supplied in 38 lengths from ¾" to 6" and in diameters from ⅛" to 1".

We can fill your order immediately from stock in most any size and quantity.

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Be Good to your Lathe

Use Any Standard Knurls ⅜" x ¾"

PRODUCES IDENTICAL
DUPLICATE KNURLED PARTS
EASILY — QUICKLY — SAFELY

Easy on centers, easy on lathe, easy on operator. Long parts can be easily knurled. Knurls near shoulders. Two sizes: $\frac{1}{16}$" to 2" — 2" to 4". For large or small lathes.

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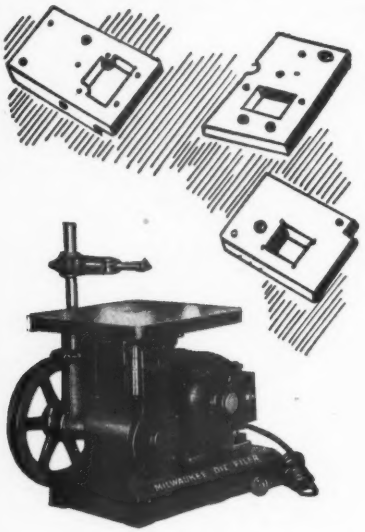


For SPEEDY INSPECTION of INTERNAL FILING . . .

The Milwaukee Die Filer is designed to promote fast and frequent inspection of internal filing or sawing operations. The file support unit or saw over-arm swings out of the way instantly, to permit quick checking of the work and instant return to exact original setting. No complex file mechanism to take apart and re-assemble.

This compact, versatile machine gives users the maximum benefits of reciprocal machine filing.

Write For New Illustrated Bulletin

$125.00 F.O.B. Milwaukee **COMPLETE with MOTOR and SAW ATTACHMENT**

$118.50 without Saw Overarm. For machines without motor, deduct $8.50 from these prices.

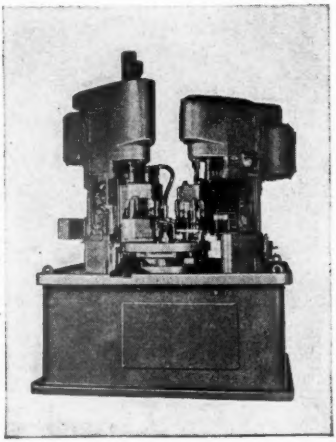
Manufactured by

Milwaukee CHAPLET & MANUFACTURING CO.

1029 S. 40th ST., MILWAUKEE 4, WIS.

Step Reaming and Threading Thin Walls

Illustrated here is the new six spindle hydraulically operated, automatic indexing type machine, designed and built as a high production unit by Kaufman Manufacturing Co., Dept. TJ, Manitowoc, Wisconsin. It is tooled to step-ream and thread malleable iron thin wall conduit connectors and nuts, all operations being automatic, hydraulically performed and electrically controlled. The reaming head has a range of speeds comprising "rapid advance," "feed," "dwell" and "rapid retraction". The threading head is equipped with a lead screw that can be changed to fit the pitch of thread to be cut. This machine is particularly designed to increase production with a decrease in operating labor costs. The electric motor equipment consists of two 5 hp motors mounted on "Reeves" Variable Speed Drives; one 5 hp motor to drive the hydraulic pumps and one 2 hp self-contained centrifugal coolant pump. The base is of welded steel normalized as a unit and then machined to assure that no welding strains are present in the finished product. It is so designed that the electrically controlled panel, the hydraulic reservoir, the coolant pump, and the chip depository are integral.



INFORM-A-GRAM KEY No. 865-A

18 WAYS TO SAVE TIME & MONEY *with the* MEAD *Industrial Burring Machine*

New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time"—install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.

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Specialties Co.
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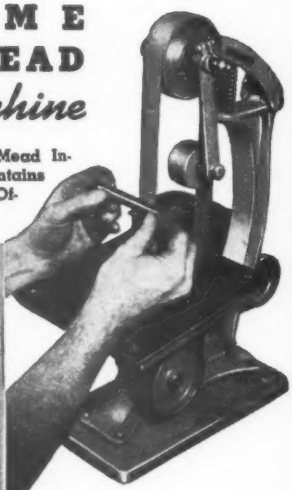
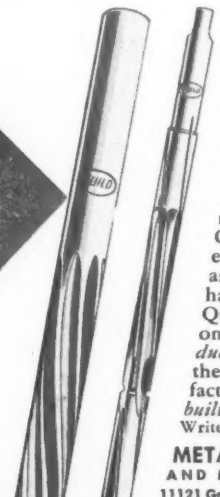
CHICAGO 41, ILL.

Steel Shaft
Remove Drilling Burrs Without Spoiling Finish or Leaving Flat Spots
Round Off Slots, Remove Milling Burrs
Remove Flash



For METAL · PLASTIC · WOOD

GUILD *Reamers*
HALLMARK OF *Precision* IN THE MANUFACTURE OF *Special Reamers*



HIGH SPEED STEEL — *in sizes from .030 diam.*
CARBIDE TIPPED — *in sizes from .200 diam.*
STRAIGHT • SPIRAL • STEP • PILOT • HAND

● GUILD is the new name for an old established line of reamers whose reputation for accuracy has become outstanding in the manufacture of aircraft—motors—engines—small arms—radios—fine instruments, etc. The name GUILD is stamped on each individual reamer as an identification—a hallmark of finest quality. Quality that is possible only by *creative* and *productive* ability far above the average in the manufacture of *reamers specially built for special purposes.* Write for booklet.

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What STERLING *is to silver* (GUILD) *is to Reamers*

FAVORITE
REVERSIBLE RATCHET
WRENCH

Three sizes of handles . . . each handle takes many different heads . . . each head fits two different size nuts.

Obtainable from your Distributor

THE ONLY WRENCH WITH ALL THESE FEATURES . . .

- Each head fits two different sizes of nuts
- Positive, instantly reversible ratchet action
- Can be used over long studs
- Does not chew nuts
- Operates in narrow spaces
- Tightens nuts quicker
- Cannot slip off nuts

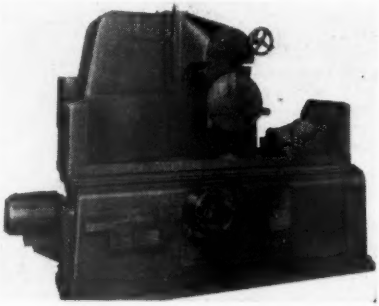
Write for Complete Information

GREENE, TWEED & CO.

Bronx Blvd. at 238 St., New York 66, N. Y.
Plants at New York, N. Y. and North Wales, Pa.

Crush Form Truing

Crusher grinding of irregular contours on grinding wheels to produce precision parts or form tools, is accomplished on this equipment manufactured by Thompson Grinder Co., Dept. TD, 1534 West Main St., Springfield, Ohio. This device for crush form truing of grinding wheels consists of a hardened

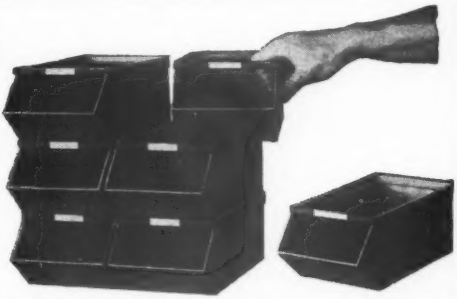


steel roll mounted on a spindle which is supported in super-precision ball bearings. The spindle is driven by a ¼ hp geared head motor through V belt drive. The crusher roll is operated at peripheral speed of approximately 300 sfpm. The truing device is mounted at the end of the machine work table and wheel truing is accomplished by moving the table to the end of its stroke and positioning the crusher roller under the vertical center line of the grinding wheel. The grinding wheel is then lowered until contact is made with the crusher roll. The truing device is then started by energizing the geared head motor, next the operator feeds the wheel to full form depth. While not feeding, the operator must use care not to let the wheel idle on the crushing roll for this laps out the crushing roll causing it to lose the desired shape. Driving the crushing roll by use of the geared head motor or driving the wheel at a reduced speed, which in turn drives the crushing roll, have both produced very satisfactory results. The most desirable coolant is a good grade of thread grinding oil which tends to hold the form on the grinding wheel and greatly assists in crushing the wheel.

INFORM-A-GRAM KEY No. D94-A

PARTS

where you want them— when you want them



You'll save time, space and labor handling parts and materials when you use these patented STACKBINS. STACKBINS keep parts instantly accessible—eliminate waste hand motions—stack compactly to form units of exactly the right shape and capacity—make order filling or assembly work faster, easier, more efficient.

STACKBINS

Manufactured and sold in Canada exclusively by Walter H. Wickware, Ottawa

Write STACKBIN CORP., 97 Troy Street - PROVIDENCE 1, R. I.

STACKBIN SYSTEM

"Stacked and Still Accessible"

New THREAD PICK-UP PROJECTOR INCREASES GRINDER PRODUCTIVITY AS MUCH AS 50% . . . SOMETIMES MORE!

- Reduces grinding time
- Wheel and Diamond Life greatly prolonged
- Salvages threaded parts oversize .0003 or more
- Stock removed equally from both flanks
- Beginners can use expertly—quickly

The Thread Pick-up Projector is an optical device for setting the driving dog on pre-threaded work. Allows grinding wheel to enter trough of thread to remove finishing stock from both flanks accurately and without adjustment. Lead is picked up while previous piece is being ground—no time is lost. Viewing screen enlarges thread for quick, accurate check of root depth and angle. Picks up A. N., Acme and Whitworth threads. Operates in conjunction with any thread grinder.

Write for BULLETIN No. 441 today!

ACME

ACME INDUSTRIAL CO.

(SCIENTIFIC DIVISION)

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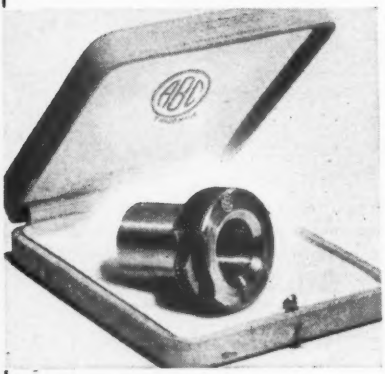
CHICAGO 7, ILL. MON. 412

JEWELS OF PRECISION



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Prompt Delivery from Stock

- HEADLESS PRESS FIT
- HEAD PRESS FIT
- FIXED RENEWABLE
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- HEADLESS LINERS

also

SCREWS • CLAMPS
LOCATING JIGS

Send for New Catalog No. 243

ACCURATE BUSHING COMPANY
447 NORTH AVE., GARWOOD, N. J.

Progressive Battery Welder

Storage Battery operated welders, recently announced by Progressive Welder Co., Dept. DJ, 3052 Outer Drive, Detroit 12, Michigan, do not require special power lines. The photograph shows one of the "smaller" models in a plant having only a limited amount of power available. It is connected direct to the

220-volt shop wiring system through a battery charger which has a maximum 3-phase draw of only 26.7 kva. This plant is turning out fluted structural steel Naval Ordnance sections at a rate of 1440 spot welds per hour.

To weld, the operator steps on the treadle control to start operation of the simple timer. Just enough of an interval is allowed by the timer between welds to shift to the next weld position.

The welder itself is of the rocker arm type, with batteries, in place of the conventional transformer, and the air-actuated contactor-controller, which operates on the carbon-pile principle located in the base of the machine.

The amount of current is controlled by the pressure between the two carbon discs in the contactor-controller. When the pressure is removed, current stops flowing, permitting opening of the contactor by separating the carbon discs without arcing, although the welding current is around 20,000 amps.

The 12 battery cells are kept charged by the automatic charger with its peak draw of 80 amps, three phase. Service requirements consist mainly of adding water to the battery about once every three weeks, and occasional point dressing.

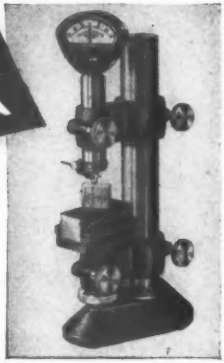
INFORM-A-GRAM KEY No. 146-A

MIKROKATOR

"MIKRO" (MINUTE)

FRICTIONLESS AMPLIFICATION

Positive, Dependable Repeat Readings



NO friction, lag or backlash . . . no racks, pinions, gears, levers, etc. subject to wear. Pointer responds instantly without swinging past true reading. Amplification is 100% mechanical, no lights or electromagnets, no warming up period required. Easily moved to different locations as there are no electrical connections. Our engineering department is at your service for applying Mikrokator to your measuring problem.

WRITE FOR LITERATURE—T.D.J.

Graduated — .0001" to .00001".

Graduated — .001 mm to .0002 mm.

SWEDISH GAGE CO., OF AMERICA

8900 ALPINE AVE., DETROIT 4, MICH.

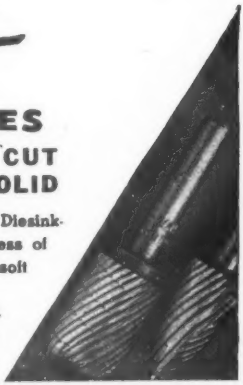
Grobet

ROTARY FILES

HAND CUT — MILLED CUT
GROUND FROM THE SOLID

There is a Grobet Rotary File, Cutter, Diesinker's Bur in shape, size, and coarseness of cut for every type of hard or soft metal, plastic, wood, etc.

Send for Catalog Y. R. illustrating the complete line in full size, speed charts, etc.



GROBET FILE CO. of AMERICA

421 Canal Street — 1812 — 1943 — F. L. GROBET — **New York 13, N. Y.**

IMPORTERS OF GROBET SWISS FILES — MFRS. OF GROBET ROTARY FILES

PLANTS: NEW YORK · CHICAGO · LOS ANGELES

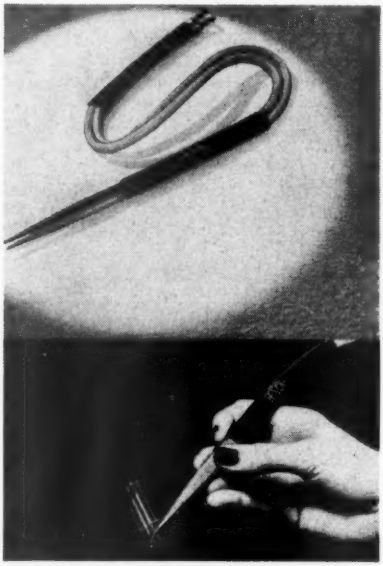
6
TIMES AS MANY
THREADED
HOLES
with
REG U.S. HY-PRO PAT. OFF.
TAPS
Read this excerpt from article in
American Machinist

"High-speed steel ground thread taps cost more than cut thread taps, but cost per tapped hole is much less, as when tapping at high speeds a ground thread tap will usually produce at least six times as many holes as a cut thread tap. It also requires less power. All conditions being equal, the ground thread tap requires about one-fifth the sharpening for the same number of tapped holes and is less easily broken."

Commercial, Precision
Special
Ground Thread Taps
Send for catalog on
Company Letterhead
HY-PRO TOOL CO.
New Bedford, Mass., U.S.A.

Spot Welding Tweezers

For uniting tiny, nearly inaccessible parts of an assembly, Besco Spot Welding Tweezers have recently been developed by New Jersey Jewelers' Supply, Dept. T, 280 Plane St., Newark 2, New Jersey. They are insulated, forged copper tweezers with plastic covered, flexible copper leads terminating in a pair of



lugs which connect in place of regular welding electrodes. They were originally developed to weld radio tube wires of .003" OD and operate on from ½ to 1 KVA on 10 AMP current and are used with a timer which cuts the current and times each weld. In use, they have made as many as 4,000 welds per hour. Flexibility of the device permits its use in practically any position. Standard leads are 18" although leads of up to 36" can be furnished. Besco Spot Welding Tweezers will unite copper parts, nickel, steel, tin, tin alloys, brass, monel, zinc, bronze, nickel to tungsten and copper to nickel. For maintenance these tweezers require touching up not more than once a day and their life is from four to six months' time.

INFORM-A-GRAM KEY No. D96-A

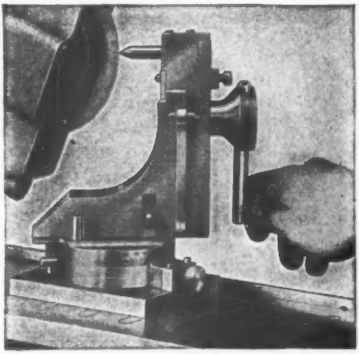
USE

Fluid-motion

for modern form-dressing

ONE SETTING
HANDLE
CONTINUOUS MOTION

The J & S Model "E" Radii and Angle Dresser in the new "Fluid-motion" series is one of the finest precision dressing instruments procurable—regardless of cost.



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Fluid-motion dressing
.0001" accuracy
Automatic centering
14" wheel capacity
Large range yet compact
Chatterless and dustproof

J. & S. TOOL CO.

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The best "soft" hammers and mallets are rawhide — tough, resilient, long-lasting C/R mechanical rawhide. They strike effective blows without battering or marring . . . without fatiguing re-coil. They hold their true striking surfaces. Sizes and weights for every need. Hammers are malleable iron with replaceable C/R Rawhide insert faces.

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CHICAGO Rawhide MFG. CO.

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Portable Storage Rooms

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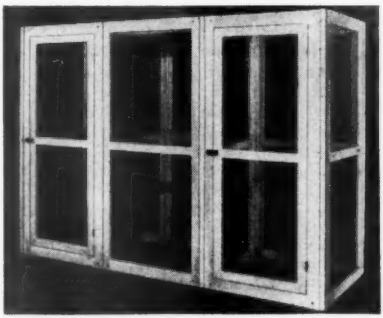


separating individual rooms) or in double rows connecting back to back, with a common wall or partition between the two rows. All door panels have sturdy, padlock type hasps and the rooms are complete except for the door padlocks. Frames are of substantial wood (1⅛" thick), mortised and tenoned with glued joints and are covered with heavy, galvanized wire screening. Their interlocking panels provide for quick, easy assembly or dismantling without the use of tools, screws, or nails. Complete units are rat, mouse and pilfer proof with maximum ventilation and light. Regular employees can move these light weight rooms which are provided with floor anchoring features where desired. Wall, door and ceiling sections can be supplied with solid panels or expanded metal screening instead of hardware cloth screening. Complete installation time for a 6 x 6 ft room, from the uncrating of all parts to finishing the setup, is only 30 minutes. With every shipment, complete instructions and erection charts with additional parts list prices are furnished.

INFORM-A-GRAM KEY No. D95-A

MEASURING A PLUG GAGE WITH LIGHT WAVES

using an optical flat, a toolmakers flat and a gage block

The formula is:

$$D = h + \left(.000012 \times N \times \frac{W}{w}\right)$$

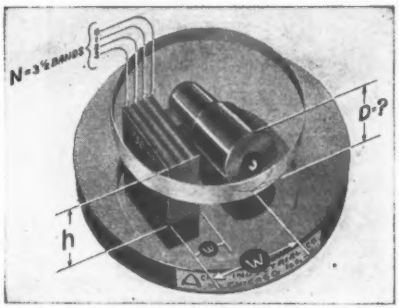
Substitute the actual values

$$D = .750 + \left(.000012 \times 3\tfrac{1}{2} \times \frac{1\ 7/16''}{23/64''}\right)$$

and get the answer

D = .750168 inch.

It's just that simple!



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are available in

17 sizes

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.1718, .1875—$1.80 Doz., $20.50 Gross.

.2187, .250—$2.20 Doz., $25.10 Gross.

Working Assortment—1 Doz. each of 17 sizes from .032" to .250"—$24.75.

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Expanders included with each shipment.

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ACRO TOOL & DIE WORKS

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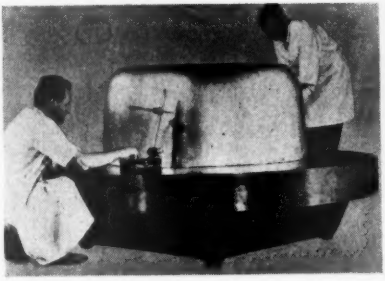
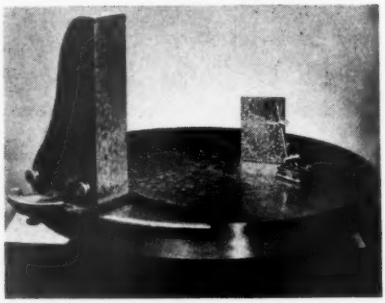
Radial Layout Plate

The MLM Radial Layout Plate, manufactured by the Contour Company, Dept. TD, 43 East Green St., Pasadena 1, Cal., provides a new, faster and more economical means of transferring infor-





mation from blueprint or loft to master model, pattern, jig or fixture. This newest of production aids is engineered to make available a flat working surface in any of the three dimensions. These surfaces intersect each other at 90 degrees. Through the use of specially designed protractors, a flat vertical surface is automatically held on the radius line throughout the entire 360 degrees. MLM Radial Layout Plates are furnished in two regular sizes of 24" and 96" though other sizes are custom built. All plates are normalized with a hand scraped surface on the 24" plate and available on the 96" plate. In addition to the top surface, outer edge and supporting points, the lower edge is also machined for clamping purposes.

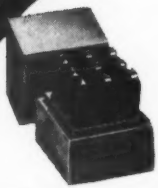
INFORM-A-GRAM KEY No. D30-A

ACROMARK HEAVY DUTY STEEL STAMPS

For deep, accurate marking on alloy steels, castings, parts, etc.

Features:

- Designed with perfect balance and alignment for accurate marking.
- Strong heavy bevel for extra biting strength and tapered to face for easy, precise positioning.
- Scientifically rounded head to prevent splitting or chipping, full-bodied and extra length for maximum service.



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If you could draw and form several times as many pieces as formerly, even on deep draws, between redressings, that would help.

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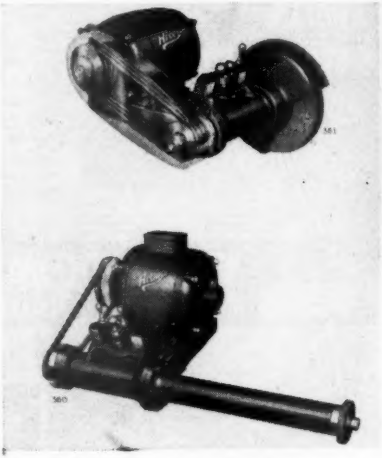

size or shape of grinding wheel to handle such materials as steel, cast iron, rubber, brass, paper and many unusual materials. They are either strictly internal or external grinders or a combination of both for the internal and external grinding heads are interchangeable. They can be used in vertical or angular position for a limited time. For constant use in vertical position, a special lubrication system can be provided at extra cost. The machine is capable of securing laboratory accuracy requirements although it is rugged for production service. Hisey grinders, with powerful, constant speed motors operate at practically the same speed under any load within their rated capacity. Standard machines meet most demands though many specials are built for single purpose applications or for use as special machine units.

INFORM-A-GRAM KEY No. 542-A

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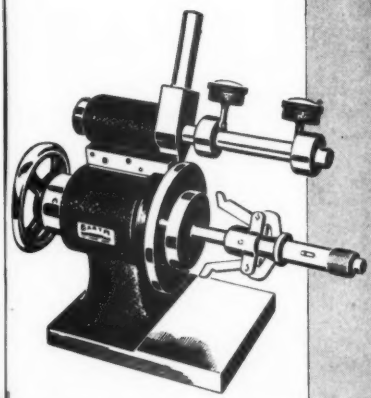

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Diamond Tool Co., Not Inc.
Koebel Diamond Tool Co.
Smit & Sons, Inc., J. K.
Wheel Trueing Tool Co.
DIE CASTING MACHINES
Lester-Phoenix, Inc.
DIE CENTERS—Hard Carbide
Firth-Sterling Steel Co.
DIE FILING MACHINES
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
DIE HANDLING TRUCKS
Hamilton Tool Co., The
DIE MAKERS' SUPPLIES
Acme Industrial Co.
Carboloy Co., Inc.
Continental Machines, Inc.
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
Star Machine & Tool Co.
DIE SECTIONS—Composite Steel
Allegheny Ludlum Steel Corp., Forging & Casting Div.
Firth-Sterling Steel Co.
DIE SETS
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Producto Machine Co., The
DIE STEEL (See STEEL — Tool & Die)
DIE STOPS—Automatic
West, R. C.
DIE SUBSTITUTE MACHINES
O'Neil-Irwin Mfg. Co.
DIES
Alofs Mfg. Co.
Armstrong Bros. Tool Co.
Barth Stamping & Machine Works
Bone Tool & Gauge Co.
Davis Tool & Engineering Co.
Denning Mfg. Co., The
Dresel-Betz Co.
General Die & Tool Co.
Hartley Wire Die Co.
Lorain Machine & Tool Co., The
Master Gauge Co.
McKinney Tool & Mfg. Co., The
National Machine Tool Co.
Paramount Tool Co.
Rane Tool Co., Inc.
Schraner & Co., A. P.
Triangle Engineering Co.
Variety Machine & Stamping Co.
Viking Tool & Machine Corp., The
Whistler & Sons, Inc., S. B.
DIES—Bolt
Armstrong Bros. Tool Co.
DIES—Carbide
Firth-Sterling Steel Co.
DIES—Die Casting
Federal Tool Corp.
DIES—Forming
Algoma Products
DIES—Master Washer
Hovis Screwlock Co.
DIES—Pipe
Armstrong Bros. Tool Co.
DIES—Plastic Molding
Federal Tool Corp.
DIES—Press Brake
Dreis & Krump Mfg. Co.
DIES—Punch Press
Federal Tool Corp.
DIES—Punching & Notching
Whistler & Sons, Inc., S. B.
DIES & STOCK SETS
Armstrong Bros. Tool Co.
DIES—Template
Algoma Products
DIES—Threading
Armstrong Bros. Tool Co.
DISCS—Abrasive
Besly & Co., Charles H.
DIVIDERS
Lufkin Rule Co.
Oliver Instrument Co.
DOGS—Lathe & Milling Machine
Armstrong Bros. Tool Co.

Hydraulic Follower Machine Mills Forming Dies

A method whereby forming dies, die-casting dies, and Bakelite or permanent molds with irregular contours, can now be done without the necessity of building special machines, has recently been perfected by the Turchan Follower Machine Co., Dept. TJ, 8259 Livernois, Detroit 4, Mich. With an ordinary milling machine equipped with a Turchan Hydraulic Attachment, any desired shape can be reproduced from soft models of plaster or wood in a fraction of the time and at much lower cost. Because of its three dimensional control, one in the vertical and two in the horizontal plane, the forming of irregular shapes can be done as easily as the machining of plain surfaces, taking heavy or light cuts as desired, and eliminating all hand-work but the final surface finishing. While the adaptation of the Turchan attachment to the operation above described was originated to solve the problem of long delays in wartime production due to the many months required to build special machines, it is already being put to use in industries which have been given the "go-signal" to convert as speedily as possible to peacetime production. In reporting the new method as applicable to any milling machine, the manufacturer calls attention to the fact that it is equally applicable to boring mills for performing the same classes of work.

INFORM-A-GRAM KEY No. 104-A

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Die Supply Co.
Producto Machine Co., The
DRAWBARS
General Die & Stamping Co.
DRESSERS—Angle
J & S Tool Co.
DRESSERS—Diamond
Carboloy Co., Inc.
Meyers Co., Inc., W. F.
DRESSERS—Radius
J & S Tool Co.
Scherr Co., Inc., George
DRESSERS—Wheel
Lee Co., K. O.
DRESSING STICKS
Carborundum Co.
Norton Co.
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Armstrong Bros. Tool Co.
DRILL JIG BUSHINGS
Acme Industrial Co.
Colonial Bushings, Inc.
DRILL POINTERS
Oliver Instrument Co.
DRILL PRESS (See PRESSES—Drill)
DRILL ROD
Allegheny Ludlum Steel Corp.
Darwin & Milner, Inc.
Latrobe Electric Steel Co.
DRILLING ATTACHMENTS
Rusnok Tool Works
DRILLING—Disintegrator
Elox Corp.
DRILLING HEADS—Adjustable
Linderme Machine & Tool Co., Inc.
DRILLING HEADS—Turret
Madco Products, Inc.
DRILLING MACHINES
Sommer & Adams Co., The
DRILLING POSTS
Armstrong Bros. Tool Co.
DRILLING & REAMING MACHINES—Deep Hole
Builders Iron Foundry
DRILLS—Carbide Tipped
Goral Tool Co.
DRILLS—Core
Ex-Cell-O Corp.
DRILLS—Hardsteel
Black Drill Co. (Div. Black Industries)
Die Supply Co.
DRILLS—High Speed, Straight Shank
Eastern Tool Supply Co.
DRILLS—Oil Hole
Detroit Reamer & Tool Co.
DRILLS—Ratchet
Armstrong Bros. Tool Co.
DRILLS—Tool-Forged
Republic Drill & Tool Co.
DRILLS—Sensitive
Production Machine Co.
DRILLS—Special
Detroit Reamer & Tool Co.
DRILLS—Twist
Cleveland Twist Drill Co.
National Twist Drill & Tool Co.
DRIVES—Gearshift
Lima Electric Motor Co., The
DRIVES—Motorized
Master Electric Co., Industrial Equipment Div.
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Gorton Machine Co., George
O'Neil-Irwin Mfg. Co.
DUPLICATORS
Detroit Universal Duplicator
Turchan Follower Machine Co.
DUST COLLECTORS
Acme Tool Co.
Standard Electrical Tool Co., The

EDGES—Straight
Acme Tool Co.
Challenge Machinery Co., The
Ford Motor Co., Johansson Div.
ELEVATORS—Portable
Economy Engineering Co.
END MILLS
Bokum Tool Co.
Gorton Machine Co., George
Putnam Tool Co.
Slewek Tool Div. of Domestic Industries, Inc.
U. S. Machine Tool Mfg. Corp.
Wesson Products Co.

END MILLS—Special
Detroit Reamer & Tool Co.
ENGINEERING SERVICE
Erickson Steel Co.
McKinney Tool & Mfg. Co., The
ENGRAVING MACHINES
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.
ETCHERS—Acid, Pantographic
Preis Engraving Machine Co., H. P.
ETCHERS—Electric
Acme Tool Co.
Gorton Machine Co., George
Preis Engraving Machine Co., H. P.
ETCHING INK
Dykem Co., The
EXPERIMENTAL WORK
Merz Engineering Co.

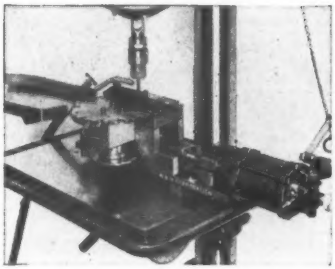
FACERS
Clark Co., Robert H.
FEED FINGERS
Hardinge Brothers, Inc.
FEEDS—Air Operated
Bellows Co., The
Mead Specialties Co.
FEEDS—Die
Dickerman Mfg. Co., H. E.
FEEDS—Stock
Dickerman Mfg. Co., H. E.
Die Supply Co.
FILES—Ebonite
Heller Brothers Co.
FILES—Rotary
Die Supply Co.
Ford Mfg. Co., Inc., M. A
Grobet File Co. of America
Hamilton Tool Co., The
Heller Brothers Co.
Nicholson File Co.
Severance Tool Industries, Inc.
FILES—Swiss Pattern
Grobet File Co. of America
FILING MACHINES—Continuous
Continental Machines, Inc.
FILING MACHINES—Die
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
FILTERS—Air Line
M-B Products
FIXTURES
Bone Tool & Gauge Co.
Cleveland Universal Jig Co.
Dresel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co.
Master Gauge Co.
McKinney Tool & Mfg. Co.
Merz Engineering Co.
Moore Special Tool Co., Inc.
Paramount Tool Co.
Sossner Tap & Tool Co.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The
Vinco Corp.
FIXTURES—Broaching (See BROACHING FIXTURES)
FIXTURES—Grinding (See GRINDING FIXTURES)
FLEXIBLE SHAFTS
Precise Products Co.
FLEXIBLE SHAFT MACHINES
Acme Tool Co.
FLOATING HOLDERS
Gairing Tool Co., The
FORGINGS—Steel
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
FORGINGS—Water & Oil Hardening
Allegheny Ludlum Steel Corp., Forging & Casting Div.
FORMERS—Wheel & Tool
Meyers Co., Inc., W. F.
FORMING TOOLS
Cooper-Bessemer Corp., The
Hardinge Brothers, Inc.
Wesson Products Co.
Wheel Trueing Tool Co.
FORMING TOOLS—Special
Detroit Reamer & Tool Co.
FURNACE HEATING ELEMENTS—Electric
Carborundum Co.
FURNACE REFRACTORIES
Carborundum Co.

FURNACES—Case Hardening
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.
FURNACES—Electric Heat Treating
Cooley Electric Mfg. Corp.
Thermo Electric Co.
FURNACES—High Speed Steel
Johnson Gas Appliance Co.
FURNACES—Laboratory
Cooley Electric Mfg. Corp.
Thermo Electric Co.
FURNACES—Melting
Johnson Gas Appliance Co.
FURNACES—Soldering
Johnson Gas Appliance Co.
Yost Mfg. Co.
FURNACES—Tempering & Drawing
Cooley Electric Mfg. Corp.
Johnson Gas Appliance Co.

GAGE BLOCKS
Dearborn Gage Co.
Ford Motor Co., Johansson Div.
Scherr Co., Inc., George
Webber Gage Co.
GAGE HANDLES
Federal Tool Corp.
Great Lakes Metal Specialties & Mfg. Co.
GAGE TOOLS
Wheel Trueing Tool Co.
GAGES—Built-Up
Master Gauge Co.
Perfex Gage & Tool Co.
Turner Gauge Grinding Co.
Vinco Corp.
GAGES—Carbide Tipped
Kennametal, Inc.
Tools & Gages, Inc.
GAGES—Center, Depth, Planer, Telescoping, Surface, Thickness, etc.
Lufkin Rule Co.
Tools & Gages, Inc.
GAGES—Concentricity
Master Gauge Co.
GAGES—Contour
Perfex Gage & Tool Co.
GAGES—Cylindrical
Pipe Machinery Co., The
GAGES—Depth
Lassy Tool Co.
GAGES—Dial
Federal Products Corp.
Sun Tool & Gauge Corp.
GAGES—Fixture
Perfex Gage & Tool Co.
GAGES—Flush Pin
Master Gauge Co.
Perfex Gage & Tool Co.
Turner Gauge Grinding Co.
GAGES—Grinding
Acro Tool & Die Works
GAGES—Height
Dickerman Mfg. Co., H. E.
GAGES—I.D. & O.D.
Federal Products Corp.
GAGES—Inspection
Comtor Co., The
GAGES—Internal Indicator Bore
Swedish Gage Co. of America
GAGES—Internal Setting
Dearborn Gage Co.
GAGES—Master Disks
Swedish Gage Co. of America
GAGES—Micrometer Dial
Ames Co., B. C.
GAGES—Multiple Inspection
Federal Products Corp.
Tools & Gages, Inc.
GAGES—Plain Plug & Ring
Acme Industrial Co.
Carboloy Co., Inc.
Elgin National Watch Co.
Master Gauge Co.
Merz Engineering Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Sav-Way Industries
Swedish Gage Co. of America
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Vard, Inc.
Vinco Corp.
GAGES—Precision
Bunell Machine & Tool Co.
Gage Co. Division
Pipe Machinery Co., The
Star Machine & Tool Co.
Tools & Gages, Inc.
Turner Gauge Grinding Co.
Woodworth Co., N. A.

K & H Air-Operated Holding Fixture

A new, more efficient air-operated holding fixture has been developed by the K & H Corp., Dept. J, Fort Wayne, Ind. While originally designed to eliminate difficulties encountered in tapping heat-treated aircraft parts, the same technique is being effectively applied to various machining operations such as drilling, reaming, counter sinking and milling. In tapping operations the fixture works entirely from the "A" surface of the nut, holding it square to the axis of the tap to within .001 or less total indicator reading. The entire assembly consists of a double action air cylinder; a plunger which is made hollow to permit effective disposal of chips; a pawl and indexing mechanism, cam and seat mounted on a suitable frame. A coolant pump supplies a good flow of clean cutting oil to the tap, and serves as an effective means of removing the chips. Successful operation on 35 to 40 lbs line pressure is obtained by use of a 3 to 1



ratio cam operated by an air cylinder having a 4.9 to 1 power increase over regular factory air line pressure. The index mechanism is operated by the return stroke of the double action cylinder. This fixture enables one operator to tap over 18,000 ¼-28NF3 aircraft nuts in an eight-hour shift. Its production record shows scrap rejections of less than one one-hundredth of one percent. K & H air-operated fixtures are now in production for various machining operations.

INFORM-A-GRAM KEY No. E41-A

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Scherr Co., Inc., George
Tools & Gages, Inc.
Tubular Micrometer Co.
Turner Gauge Grinding Co.
Vard, Inc.
GAGES—Special
Acro Tool & Die Works
Barth Stamping & Machine Works
Federal Tool Corp.
Griffin Co., George O.
Lorain Machine & Tool Co., The
Metrical Laboratories, Inc.
Pipe Machinery Co., The
Sun Tool & Gauge Corp.
Swedish Gage Co. of America
Triangle Engineering Co.
Turner Gauge Grinding Co.
Ulmer Co., The J. C.
Vard, Inc.
Viking Tool & Machine Corp., The
Vinco Corp.
GAGES—Telescoping
Brand Tool & Supply Co.
Detroit Tap & Tool Co.
Federal Products Corp.
Mers Engineering Co.
Sossner Tap & Tool Co.
Tools & Gages, Inc.
GAGES—Thread Plug & Ring
Cadillac Gage Co.
Elgin National Watch Co.
Master Gauge Co.
Perfex Gage & Tool Co.
Pipe Machinery Co., The
Vard, Inc.
Vinco Corp.
GAGES—Tool Setting
Barteit Engineering Co.
Tools & Gages, Inc.
GEAR BOXES
Western Aircraft Tool Co.
GEARS
Hartford Special Machinery Co., The
Taylor Machine Co.
GRADUATORS
Gorton Machine Co., George
GRINDER TOOLS
Norton Co.
Clark Co., Robert H.
GRINDERS—Abrasive Band & Disc
Walls Sales Corp.
GRINDERS—Attachments
Cincinnati Grinders, Inc.
GRINDERS—Automatic Cycle
Cincinnati Grinders, Inc.
GRINDERS—Bench & Pedestal
Delta Mfg. Co., The
Sanford Mfg. Co.
Standard Electrical Tool Co., The
GRINDERS—Carbide Tool
Delta Mfg. Co., The
Gorton Machine Co., George
Hammond Machinery Builders, Inc.
Lee Co., K. O.
Standard Electrical Tool Co., The
GRINDERS—Centerless & Center Type
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GRINDERS—Chip Breaker
Delta Mfg. Co., The
Lee Co., K. O.
GRINDERS—Combination Twist Drill & Tap
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GRINDERS—Cutter & Tool Attachments
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GRINDERS—Crankshaft
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GRINDERS—Cylindrical
Cincinnati Grinders, Inc.
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Norton Co.
GRINDERS—Die
Standard Electrical Tool Co., The
GRINDERS—Disc
Besly & Co., Charles H.
Lempco Products, Inc.
Standard Electrical Tool Co., The
GRINDERS—Engraving Cutter
Preis Engraving Machine Co., H. P.
GRINDERS—External
Standard Electrical Tool Co., The
GRINDERS—Face
Oliver Instrument Co.
Standard Electrical Tool Co., The
GRINDERS—General Purpose
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Standard Electrical Tool Co., The
GRINDERS—Hand (See GRINDERS—Portable)
GRINDERS—Heavy Duty
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GRINDERS—Hydraulic
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Gallmeyer & Livingston Co.
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Rivett Lathe & Grinder, Inc.
Sav-Way Industries
Standard Electrical Tool Co., The
GRINDERS—Plain, Center Type
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Dumore Co., The
Foredom Electric Co.
Precise Products Corp.
Standard Electrical Tool Co., The
GRINDERS—Potable Pneumatic
M-B Products
GRINDERS—Precision for Contours
Baker Bros., Inc.
Dumore Co., The
GRINDERS—Profile
Boyar-Schultz Corp.
GRINDERS—Ring Wheel
Besly & Co., Charles H.
Standard Electrical Tool Co., The
GRINDERS—Snagging
Standard Electrical Tool Co., The
GRINDERS—Stationary Pneumatic
M-B Products
GRINDERS—Surface
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Builders Iron Foundry
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Gallmeyer & Livingston Co.
Lempco Products, Inc.
Norton Co.
Sanford Mfg. Co.
GRINDERS—Tap
Boggis & Co., Henry P.
Gallmeyer & Livingston Co.
Minn-Kota Foundry & Mfg. Co.
GRINDERS—Tool Bit
Oliver Instrument Co.
GRINDERS—Tool & Cutter
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Cincinnati Milling Machine Co.
Cleveland Tool Engineering Co., The
Douglas Machinery Co., Inc.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Norton Co.
Oliver Instrument Co.
Production Machine Co.
Production Machinery Development Co.
Scherr Co., Inc., George
GRINDERS—Tool Post
Lempco Products, Inc.
Standard Electrical Tool Co., The
GRINDERS—Twist Drill
Gallmeyer & Livingston Co.
GRINDERS—Universal
Cincinnati Grinders, Inc.
Norton Co.
Production Machine Co.
Rivett Lathe & Grinder, Inc.
GRINDERS—Universal Tool & Cutter
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Gallmeyer & Livingston Co.
Lee Co., K. O.
GRINDERS—Utility
M-B Products
GRINDERS—Vertical Spindle
Standard Electrical Tool Co., The
GRINDERS—Wet Tool
Standard Electrical Tool Co., The
GRINDING & LAPPING—Precision
Acme Industrial Co.
J & S Tool Co.
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Carborundum Co., The
Chicago Wheel & Mfg. Co.
DeSanno & Sons, A. P.
Norton Co.
GUIDE PINS
Danly Machine Specialties, Inc.
Die Supply Co.

HAMMERS—Board Drop
Chambersburg Engineering Co.
HAMMERS—Rawhide
Chicago Rawhide Mfg. Co.
HAMMERS—Replaceable Face
Greene, Tweed & Co.
HAMMERS—Single & Double Frame Forgings
Chambersburg Engineering Co.
HAMMERS—Soft Alloy
Industrial Products Suppliers
HAMMERS—Steam Drop
Chambersburg Engineering Co.
HAMMERS—Steel Inspector
Cunningham Co., M. E.
HANDLES—Gage
Tanzi Engineering Co.
HARD SURFACING
Scully-Jones & Co.
HARDNESS TESTERS
Ames Co., B. C.
Clark Instrument, Inc.
Shore Instrument & Mfg. Co., Inc., The
Wilson Mechanical Instrument Co., Inc.
HEADS—Boring (See BORING HEADS)
HEADS—Dividing
Cincinnati Milling Machine Co.
HEADS—Milling
Gorton Machine Co., George
HEAT TREATING
Perfection Tool & Metal Heat Treating Co.
HOBBERS—Gear (See GEAR HOBBERS)
HOBS—Hook Checking Machine For
Detroit Tap & Tool Co.
HOBS—Thread
Detroit Tap & Tool Co.
U. S. Machine Tool Mfg. Corp.
HOBS—Thread Milling
Pipe Machinery Co., The
U. S. Machine Tool Mfg. Corp.
HOLDERS—Adjustable
Ford Motor Co., Johansson Div.
HOLDERS—Broach (SEE BROACH HOLDERS)
HOLDERS—Drill
Armstrong Bros. Tool Co.
Rusnok Tool Works
HOLDERS—Steel for Number
Cunningham Co., M. E.
HOLDERS—Tap
Procunier Safety Chuck Co.
HOLDERS—Tool
Acme Tool Co.
Allison Tool & Engraving Co.
Armstrong Bros. Tool Co.
Boyar-Schultz Corp.
Dearborn, Inc., Howard
Gairing Tool Co., The
Wesson Products Co.
HOLDING FIXTURES
Zagar Tool, Inc.
HONING—Contract
Enterprise Machine Parts Corp., The
HONING MACHINES—Cylindrical
Automotive Maintenance Machinery Co., (Ammco)
HONING MACHINES—Horizontal
Enterprise Machine Parts Corp., The
Sunnen Products Co.
HOUSINGS—Aluminum Sheet
Conrad & Moser
HYDRAULIC MACHINERY
Peerless Machine Co.
Rockford Machine Tool Co.

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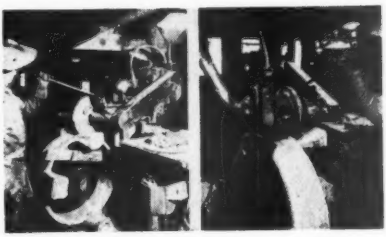
Dykem Co., The
INDEX BASES
Allison Tool & Engineering Co.
INDEXING DEVICES
Hartford Special Machinery Co., The
INDEXING FIXTURES
Zagar Tool, Inc.
INDEXING HEADS—Universal
Cleveland Tool Engineering Co., The
INDICATORS
Lufkin Rule Co.
INDICATORS—Dial
Ames Co., B. C.
Federal Products Corp.
Scherr Co., Inc., George
INSPECTION DEVICES
Barteit Engineering Co.
IRONS—Angle
Challenge Machinery Co., The

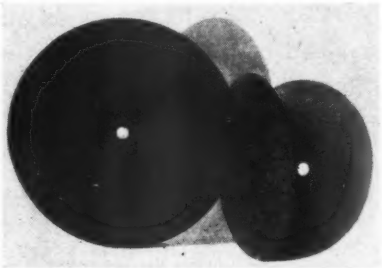
JACKS—Machine
Armstrong Bros. Tool Co.
Enterprise Machine Parts Corp.

Synthetic Rubber As Abrasive Wheel Bond

A serious shortage of materials for use in making production tools has been well remedied by the use of synthetic rubber, according to the Hycar Chemical Co. of Akron, Ohio, who are said to be the world's largest independent producers of synthetic rubber from butadiene. Prior to this war, bonding material for abrasive wheels was tree rubber; manu-



facturers were apprehensive that no satisfactory substitute for natural rubber would be found. However, the manufacturers of abrasive wheels recently reported the development of a special-purpose synthetic rubber enabling them to produce fast-cutting, long-lasting abrasive wheels for the metal working trades. National interest in rubber supply has been largely concerned with production of automobile tires, without much thought of innumerable industrial operations also dependent on a rubber source. Typically illustrating the significance of rubber bonded abrasive wheels for industrial use was one of the reports to Hycar. Tests conducted by the abrasive division of West Co., Inc.,



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Moore Special Tool Co., Inc.
JIGS
Acro Tool & Die Works
Bunell Machine & Tool Co., The
Cleveland Universal Jig Co.
Dresel-Betz Co.
Electrix Corp.
Enterprise Machine Parts Corp., The
Federal Tool Corp.
General Die & Tool Co.
Lorain Machine & Tool Co., The
Master Gauge Co.
McKinney Tool & Mfg. Co., The
Merz Engineering Co.
Moore Special Tool Co., Inc.
National Machine Tool Co.
Paramount Tool Co.
Rockford Die & Tool Works, Inc.
Schraner & Co., A. P.
Siewek Tool Div. of Domestic Industries, Inc.
Star Machine & Tool Co.
Ulmer Co., The J. C.
Viking Tool & Machine Corp., The

KEY SETS
Holo-Krome Screw Corp., The
KEYS—Socket Screw
Die Supply Co.
Holo-Krome Screw Corp., The
KNEES—Toolmakers'
Acme Tool Co.
KNOBS—Hand
Siewek Tool Div. of Domestic Industries, Inc.
KNURLING TOOLS
Armstrong Bros. Tool Co.
Brand Tool & Supply Co.
KNURLS—Steel
Mercury Metal Die & Letter Co.

LAPPING COMPOUNDS
Acro Tool & Die Works
Carborundum Co., The
LAPPING—Contract
Acme Industrial Co.
LAPPING MACHINES
Cincinnati Grinders, Inc.
Norton Co.
Schraner & Co., A. P.
LAPPING PLATES (See PLATES—Lapping)
LAPS
Acro Tool & Die Works
Boyar-Schultz Corp.
Chicago Drillet Corp.
LATHE ACCESSORIES
General Die and Stamping Co.
South Bend Lathe Works
LATHE CENTERS
Kennametal, Inc.
LATHE CONVERTERS
Master Mfg. Co., The
LATHE DOGS
Armstrong Bros. Tool Co.
LATHE STOPS
American Products Co., The
LATHE TOOL CABINETS
Armstrong Bros. Tool Co.
LATHE TOOL POSTS
Armstrong Bros. Tool Co.
LATHE TOOLS
Armstrong Bros. Tool Co.
South Bend Lathe Works
LATHES—Back-Geared
Logan Engineering Co.
LATHES—Ball Bearing
Logan Engineering Co.
LATHES—Bench
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
South Bend Lathe Works
LATHES—Engine
South Bend Lathe Works
LATHES—Magnetic Polishing
Lima Electric Motor Co., The
LATHES—Manufacturing
Logan Engineering Co.
LATHES—Metal Work
Logan Engineering Co.
South Bend Lathe Works

LATHES—Precision
Hardinge Brothers, Inc.
Logan Engineering Co.
South Bend Lathe Works
Springfield Machine Tool Co., The
LATHES—Screw Cutting
Logan Engineering Co.
LATHES—Speed
Standard Electrical Tool Co., The
LATHES—Toolroom
Hardinge Brothers, Inc.
Logan Engineering Co.
Rivett Lathe & Grinder, Inc.
Sheldon Machine Co., Inc.
South Bend Lathe Works
LATHES—Turret
Logan Engineering Co.
South Bend Lathe Works
LAYOUT FLUID
Die Supply Co.
Dykem Co., The
Michigan Chrome & Chemical Co.
LEADER PINS
Die Supply Co.
LETTERS & FIGURES—Steel
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.
LIFTERS
Cullen-Friestedt Co.
Economy Engineering Co.
Lyon-Raymond Corp.
LIGHTING EQUIPMENT—Industrial
Gorton Machine Co., George
Vimco Mfg. Co.
LOCKS—Fixture
Siewek Tool Div. of Domestic Industries, Inc.
LUBRICANTS—Gage
Protective Coatings, Inc.
LURICATORS
M-B Products
Madison-Kipp Corp.

MACHINE PARTS
Enterprise Machine Parts Corp., The
MACHINERY—Precision
General Engineering & Mfg. Co.
MACHINERY—Special
Lorain Machine & Tool Co., The
Schraner & Co., A. P.
Triangle Engineering Co.
MACHINES—Die Filing
Illinois Tool Works
Milwaukee Chaplet & Mfg. Co.
Oliver Instrument Co.
MAGNIFIERS—Headband
Carl Zeiss, Inc.
MANDRELS
Lee Co., K. O.
MANDRELS—Expanding
Lee Co., K. O.
Young Arbor Co.
MASKING DEVICES
Cunninghain Co., M. E.
Mercury Metal Die & Letter Co.
MARKING INKS—Metal
Dykem Co., The
MARKING MACHINES
Acromark Co., The
Gottscho, Inc., Adolph
Preis Engraving Machine Co., H. P.
MASTER TYPE—Marking
Preis Engraving Machine Co., H. P.
METAL—Strenes
Advance Foundry Co., The
MEASURING INSTRUMENTS—Precision
Ames Co., B. C.
MICROMETERS
Brand Tool & Supply Co.
Lufkin Rule Co.
Scherr Co., Inc., George
Tubular Micrometer Co.
MICROMETERS—Inside
Tubular Micrometer Co.
MILLING & JIG BORING MACHINES
Linley Bros. Co.
MILLING MACHINE ARBORS
Cincinnati Milling Machine Co.
MILLING MACHINES—Attachments
Burke Machine Tool Co.
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Rusnok Tool Works
MILLING MACHINES—Automatic
Cincinnati Milling Machine Co.
MILLING MACHINES—Bench
Ames Co., B. C.
Burke Machine Tool Co.
MILLING MACHINES—Continuous
Sommer & Adams Co., The

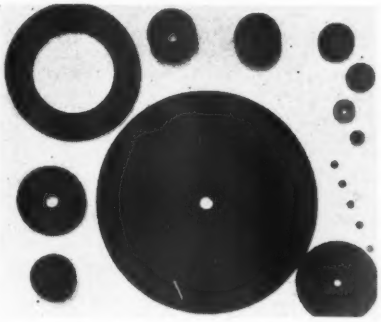
MILLING MACHINES—Dial Type
Cincinnati Milling Machine Co.
MILLING MACHINES—Duplex
Cincinnati Milling Machine Co.
MILLING MACHINES—Horizontal
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Kempsmith Machine Co., The
Lucas & Son, Inc., J. L.
MILLING MACHINES—Hydraulic
Cincinnati Milling Machine Co.
MILLING MACHINES—Motor Driven
Burke Machine Tool Co.
MILLING MACHINES—Multiple Spindle
Cincinnati Milling Machine Co.
MILLING MACHINES—Plain
Kearney & Trecker Products Corp.
MILLING MACHINES—Plain, Universal
Cincinnati Milling Machine Co.
Douglas Machinery Co., Inc.
Kearney & Trecker Products Corp.
MILLING MACHINES—Precision
Hardinge Brothers, Inc.
Kempsmith Machine Co., The
Nichols & Sons, W. H.
MILLING MACHINES—Production
Kearney & Trecker Products Corp.
Nichols & Sons, W. H.
MILLING MACHINES—Profile
Cincinnati Milling Machine Co.
MILLING MACHINES—Rail Type
Cincinnati Milling Machine Co.
MILLING MACHINES—Rotary Head
Kearney & Trecker Products Corp.
MILLING MACHINES—Vertical
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Kearney & Trecker Products Corp.
Sommer & Adams Co., The
MILLS—Hollow
Gairing Tool Co., The
Genesee Mfg. Co., Inc.
MOLDING COMPOUNDS
Catalin Corp.
MOTORS—Electric
Lima Electric Motor Co., The

NAME PLATES—Plastic
Eastern Etching & Mfg. Co.
NIBBLING MACHINES—Metal
National Machine Tool Co.
NOTCHING EQUIPMENT
Wales-Strippit Corp.
NUMBERING MACHINES
Numberall Stamp & Tool Co.

OIL LUBRICATION SYSTEMS—Automatic
Rivett Lathe & Grinder, Inc.
OILS—Quenching & Tempering
Park Chemical Co.
OPTICAL COMPARATORS
Fish-Schurman Corp.
Scherr Co., Inc., George
Trico Products Corp.
OPTICAL FLATS
Acme Industrial Co.
Scherr Co., Inc., George
OVENS—Industrial
Johnson Gas Appliance Co.

PANS—Tote
Lucas & Son, Inc., J. L.
PARALLELS—Box, Flat, Solid
Acme Tool Co.
PARALLELS—Magnetic
Scherr Co., Inc., George
PARALLELS—Solid
Challenge Machinery Co.
PARALLELS—Toolmakers
Acro Tool & Die Works
Ford Motor Co., Johansson Div.
PHOTOCOPY EQUIPMENT
American Photocopy Equipment Co.
PILOTS
Wesson Products Co.
PIPE TOOLS
Armstrong Bros. Tool Co.
PLASTIC EQUIPMENT
Say-Way Industries
PLASTIC MOLDING MACHINES—Injection
Lester-Phoenix, Inc.
PLATES—Angle
Acme Tool Co.
Smith Tool & Engineering Co.
Challenge Machinery Co., The

show that synthetic rubber bonded abrasive wheels cut faster and last longer than wheels bonded with natural rubber. On manganese bronze castings, a natural rubber bonded wheel made 50 cuts for a total of 562½ sq. in. On the same type of castings, a Hycar synthetic-bonded wheel made 99 cuts for a total of 1013¾ sq. in., practically doubling the output. Each wheel was 16" in dia. by ⅛" thick, operating at 16,000 surface fpm, and 3800 rpm spindle speed. The test on aluminum bronze castings was taking 10 cuts each with these two types of abrasive wheels. Test results showed



the Hycar-bonded wheel cut 141 sq. in. with wear of .43 sq. in. per sq. in. of metal cut as compared with the natural rubber bonded wheel which cut 112 sq. in. and showed wear of .627 sq. in. per sq. in. cut. Shown in Figs. 1 and 2 are West Abrasive wheels cutting non-ferrous castings. This Hycar-bonded wheel is said to have cut a cross section of 21 sq. in. within 45 seconds. Fig. 3 shows Hycar-bonded wheels made by the Bay State Abrasive Products Co., Westboro, Mass., which can cut 1" bar steel in 2 or 3 seconds. Shown in Fig. 4 are wheels made by the Bancroft-Hickey Mfg. Co. of Bristol, Pa. They are used in cutting off metal sections to size, leaving smooth finish cuts, or for grinding metal surfaces to extremely close tolerances. In this company's report to Hycar they say that synthetic rubber bonding is the only possible substitute for natural rubber for grinding wheels. It is compatible with resins and has good heat resistance.

INFORM-A-GRAM KEY No. D91-A

See better
◆
Work better
◆
Keep hands free

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Use of both eyes reveals true depth of details. Magnification of 2¼x. Free working distance, about 8", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Eyeshade of Tenite — practically unbreakable.

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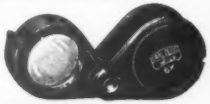

CARL ZEISS, INC.
Dept. H-53-7 485 Fifth Ave., New York 17, N. Y

PLATES—Angle Adjustable (Sine Bar)
Nichols-Morris Corp.
Robbins Engineering Co.
Triangle Engineering Co.
PLATES—Angle, Compound
Angle Computer Co.
PLATES—Bench
Challenge Machinery Co., The
Delta Mfg. Co., The
PLATES—Cold (See COLD PLATES)
PLATES—Index
Vinco Corp.
PLATES—Lapping
Acme Tool Co.
Challenge Machinery Co., The
Delta Mfg. Co., The
Smith Tool & Engineering Co.
PLATES—Surface, Glass (See SURFACE PLATES, Glass)
PLUGS—Hollow & Socket Pipe
Die Supply Co.
Holo-Krome Screw Corp., The
POINT THINNER
Oliver Instrument Co.
POINTS
Ford Motor Co., Johansson Div.
Norton Co.
POLISHERS & BUFFERS
Hammond Machinery Builders, Inc.
Production Machine Co.
Sommer & Adams Co., The
Standard Electrical Tool Co., The
POLISHING GRAINS & POWDERS
Carborundum Co.
Norton Co.
POLISHING WHEELS—Rubber
Chicago Wheel & Mfg. Co.
PRECISION PARTS—Aircraft
Pipe Machinery Co., The
PRECISION PARTS—Hardened & Ground
Acme Industrial Co.
PRESSES—Air
Mead Specialties Co.
PRESSES—Arbor
Lempco Products, Inc.
Wilson, K.
PRESSES—Bench, Punch
Benchmaster Mfg. Co.
PRESSES—Broaching
American Broach Machine Co.
PRESSES—Drill
Baker Bros., Inc.
Delta Mfg. Co., The
Hamilton Tool Co., The
PRESSES—Flanging
Cincinnati Shaper Co., The
PRESSES—Hydraulic
Lempco Products, Inc.
PRESSES—Straightening
American Broach & Machine Co.
Denison Engineering Co., The
PRESSES—Utility or Shearing
Producto Machine Co., The
PRODUCTION JOB WORK
Rockford Die & Tool Works, Inc.
PRODUCTION MACHINE REPAIR PARTS
Enterprise Machine Parts Corp., The
PROFILERS
Acme Tool Co.
PROJECTORS
Scherr Co., Inc., George
PUMPS—Centrifugal
Ruthman Machinery Co., The
PUMPS—Circulating
Ruthman Machinery Co., The
PUMPS—Coolant
Ruthman Machinery Co., The
PUMPS—Lubricant
Ruthman Machinery Co., The
PUNCHES—Center & Drive Pin
Lufkin Rule Co.
PUNCHES—Interchangeable
Cincinnati Tool Co., The
PUNCHES—Hand, Toggle Action
Knu-Vise, Inc.
PUNCHES—Standard & Interchangeable
Hovis Screwlock Co.
Wales-Strippit Corp.
Whistler & Sons, Inc., S. B.
PUNCHING ATTACHMENTS
Dreis & Krump Mfg. Co.

REAMER DRIVES
Lee Co., K. O.
REAMERS
Black Drill Co.
Cleveland Twist Drill Co., The
Evans Reamer & Machine Co.
National Twist Drill & Tool Co.
Putnam Tool Co.
Super Tool Co.
Wesson Products Co.
REAMERS—Carbide
Super Tool Co.
REAMERS—Ground Flute
Lavallee & Ide, Inc.
REAMERS—Special
Detroit Reamer & Tool Co.
Lavallee & Ide, Inc.
Metal Cutting Tools & Mfg. Co.
REAMERS—Straight
Metal Cutting Tools & Mfg. Co.
REAMERS—Taper Pin
Lavallee & Ide, Inc.
RESINS—Cast
Catalin Corp.
RETAINERS—Punch & Die
Hovis Screwlock Co.
RIVETING MACHINES
Linley Brothers Co.
Tomkins-Johnson Co., The
ROLLER FEEDS—Automatic
Wittek Mfg. Co.
RUBBER ABRASIVES—Soft
Roberts Rubber Co., Weldon, (Brightboy Industrial Div.)
RULES—Steel
Lufkin Rule Co.

SALTS—Cyanide, Neutral & Hi Speed Steel
Park Chemical Co.
SANDERS
Walls Sales Corp.
SAWING MACHINERY
Tannewitz Works, The
SAWING MACHINES—Continuous
Continental Machines, Inc.
SAWING MACHINES—Metal
Armstrong-Blum Mfg. Co.
Peerless Machine Co.
SAWS—Band
Barnes Co., Inc., W. O.
Kalamazoo Tank & Silo Co.
Tannewitz Works, The
SAWS—Diamond (See DIAMOND SAWS)
SAWS—Foundry
Tannewitz Works, The
Wells Mfg. Corp.
SAWS—General Purpose
Wells Mfg. Corp.
SAWS—Heavy Duty
Wells Mfg. Corp.
SAWS—Hole
Armstrong-Blum Mfg. Co.
SAWS—Hydraulic
Peerless Machine Co.
SAWS—Tool & Die Shop
Wells Mfg. Corp.
SCALES—Ellipse
Martin Design Studios
SCALES—Steel
Lufkin Rule Co.
SCREW MACHINE PRODUCTS—Contract
Star Machine & Tool Co.
SCREW MACHINES—Hand
Logan Engineering Co.
SCREWS—Hexagon Head Cap
Strong, Carlisle & Hammond Co.
SCREWS—Hollow Set & Shoulder
Die Supply Co.
Strong, Carlisle & Hammond Co.
SCREWS—Socket Head
Chicago Screw Co., The
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Standard Pressed Steel Co.
Strong, Carlisle & Hammond Co.
SCREWS—Socket Head Cap
Holo-Krome Screw Corp., The
SCREWS—Square Head Set
Strong, Carlisle & Hammond Co.
SCREWS—Transfer
Die Supply Co.
SCREWS—Turn
Inter-State Designing & Tool Co.
SCRIBERS
Ford Motor Co., Johansson Div.
Lufkin Rule Co.
SHAFT MACHINES—Flexible
Haskins Co., R. G.
SHAFTS—Worm
Ace Mfg. Corp.

SHAPER TOOLS
Armstrong Bros. Tool Co.
SHAPERS
Ames Co., B. C.
Automotive Maintenance Machinery Co., (Ammco)
General Engineering & Mfg. Co.
SHARPENING STONES
Carborundum Co.
Norton Co.
SHEARS
Cincinnati Shaper Co., The
SHEARS—Bench
National Machine Tool Co.
O'Neil-Irwin Mfg. Co.
SHIMS—Stick
Industrial Products Suppliers
SINE BARS
Ford Motor Co., Johansson Div.
Vinco Corp.
SLOTTERS
Ames Co., B. C.
Douglas Machinery Co., Inc.
SLOTTERS—Universal
Douglas Machinery Co., Inc.
SPACERS—Arbor
Detroit Stamping Co.
Industrial Products Suppliers
SPANNERS
Armstrong Bros. Tool Co.
Sommer & Adams Co., The
SPECIAL MACHINERY
Builders Iron Foundry
Bunell Machine & Tool Co.
Enterprise Machine Parts Corp., The
Industrial Machine Co.
McKinney Tool & Mfg. Co., The
Merz Engineering Co.
Peerless Machine Co.
SPECIAL TOOLS
Rockford Die & Tool Works, Inc.
U. S. Machine Tool Mfg. Corp.
SPEED CONTROL VALVES
Tomkins-Johnson Co., The
SPINDLES
Say-Way Industries
SPOTFACERS
Bokum Tool Co.
Continental Tool Works, Div. of Ex-Cell-O Corp.
Wesson Products Co.
SPOTTING PASTE
Dykem Co., The
SPRINGS
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
Muehlhausen Spring Corp.
SPRINGS—Die
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
Muehlhausen Spring Corp.
SQUARES—Combination, Try & Miter
Lufkin Rule Co.
STACKERS
Economy Engineering Co.
STAMPINGS
Acro Tool & Die Works
Alofs Mfg. Co.
Detroit Stamping Co.
Federal Tool Corp.
General Die & Tool Co.
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
Star Machine & Tool Co.
Variety Machine & Stamping Co.
STAMPINGS—Metal
Davis Tool & Engineering Co.
Dressel-Betz Co.
STAMPINGS—Precision
Gibson Co., The, William D. (Div. of Associated Spring Corp.)
STAMPS—Steel
Cunningham Co., M. E.
Gottscho, Inc., Adolph
Hoggson & Pettis Mfg. Co., The
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.
Sossner Tap & Tool Co.
STEEL—Aircraft
Wheelock Lovejoy & Co., Inc.
STEEL—Alloy
Allegheny Ludlum Steel Corp.
Bissett Steel Co., The
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Wheelock, Lovejoy & Co., Inc.
STEEL—Alloy, High Nickel
Carpenter Steel Co., The
STEEL—Carbon
Bissett Steel Co., The
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Firth-Sterling Steel Co.

NUMBERALL

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(Patented)

A single wheel Stamp for stamping figures and letters on brass, aluminum or soft steel, also plastic and wood, with but a single hammer blow. All figures on 1 wheel, entire alphabet on 2. One stamp replaces 12 individual, hand stamps. Wheel of tool steel. Characters, engraved for maximum stamping service, furnished any size from 1/16" to 3/8". Also supplied with shank for press. Write for Bulletin TD - IH.

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Once used, these optical tools will be indispensable. For use on surfaces and details not measurable by other means.

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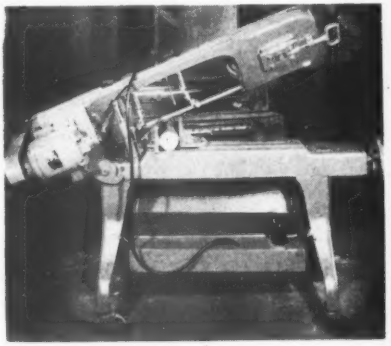
Kalamazoo Band Saw

Smooth, fast, accurate and continuous cutting action makes the band saw a modern and efficient method for cutting off metal. Kalamazoo Tank & Silo Company, Machine Tool Div., D-4, Kalamazoo, Mich., manufactures two sizes of band saws with an 8" throat opening, and 16" and 24" vise openings. Bar stock can be cut in single pieces or in gangs up to the capacity of the vise. Tubes, rods, angles, heavy round or flat stock, as well as odd and unusual shapes



are cut with equal convenience and speed. Speed is accomplished thru the continuous cutting action which is smooth and quiet. Wafer-thin cuts can be made to the full width of the throat with only a variation of a few thousandths in thickness, which reduces waste of expensive steel and permits cutting to close dimensions.

Protection for the operator has been carefully built in, only the cutting portion of the blade being exposed. It is impossible to insert fingers in moving wheels or parts, as they are entirely enclosed.

Blade breakage due to the frame dropping is minimized thru hydraulic control of the frame movement.

Blades run cool at moderate speeds while cutting hard materials, however, for extremely high speed production cutting, a coolant system is available which increases blade life to a considerable extent. The machine may be mounted on casters, making it possible for one man to move it to any plant location.

INFORM-A-GRAM KEY No. A89.5-A

STEEL—Chromium
Darwin & Milner, Inc.
STEEL—Cobalt
Darwin & Milner, Inc.
STEEL—Cold Drawn
Bissett Steel Co., The
STEEL—Composite Die Sections
Allegheny Ludlum Steel Corp., Forging & Casting Div.
STEEL—Die (See STEEL—Tool & Die)
STEEL—Die Casting
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
STEEL—Die Sections—Forged
Allegheny Ludlum Steel Corp., Forging & Casting Div.
STEEL—Drill
Crucible Steel Co. of America
STEEL—Electrical
Allegheny Ludlum Steel Corp.
STEEL—Graphitic
Timken Roller Bearing Co., The, Steel & Tube Div.
STEEL—Heat Resisting
Allegheny Ludlum Steel Corp.
STEEL—High Speed
Allegheny Ludlum Steel Corp.
Armstrong Bros. Tool Co.
Bokum Tool Co.
Cleveland Twist Drill Co.
Columbia Tool Steel Co.
Crucible Steel Co. of America
Darwin & Milner, Inc.
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
STEEL—Hobbing
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
Firth-Sterling Steel Co.
STEEL—Mold
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
STEEL—N.E. Analysis
Bissett Steel Co., The
STEEL—Punch, Chisel & Shock Resisting
Allegheny Ludlum Steel Corp.
Latrobe Electric Steel Co.
STEEL—Special Purpose
Allegheny Ludlum Steel Corp.
Crucible Steel Co. of America
STEEL—Stainless
Allegheny Ludlum Steel Corp.
Carpenter Steel Co., The
Crucible Steel Co. of America
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
STEEL—Strip, Hot & Cold Rolled
Allegheny Ludlum Steel Corp.
STEEL—Tool & Die
Allegheny Ludlum Steel Corp.
Armstrong Bros. Tool Co.
Carpenter Steel Co., The
Cleveland Twist Drill Co., The
Crucible Steel Co. of America
Columbia Tool Steel Co.
Darwin & Milner, Inc.
Firth-Sterling Steel Co.
Latrobe Electric Steel Co.
Wheelock, Lovejoy & Co., Inc.
STEEL PLATE—Fabricator
Detroit Die Set Corp.
STEEL PLATE—Ground
Die Supply Co.
STEEL PLATE—Rough or Machined Torch Cut Shapes
Danly Machine Specialties, Inc.
Detroit Die Set Corp.
Die Supply Co.
STENCILS—Metal
Gottscho, Inc., Adolph
SURFACE PLATES (See PLATES, Surface)
SURFACE PLATES—Granite
Herman Stone Co., The
SURFACERS—Disc and Belt
Production Machine Co.
SURFACING MACHINES—Belt Type
Production Machine Co.
SUTTONIZING
Welding Equipment & Supply Co.

TABLES—Circular
Gorton Machine Co., George
TABLES—Elevating, Portable
Lyon-Raymond Corp.
Hamilton Tool Co., The
TABLES—Index
Gorton Machine Co., George
TABLES—Rotary
Acme Tool Co.
Gorton Machine Co., George
TABLES—Turn
Challenge Machinery Co., The
TAP EXTRACTORS
Clinton Machine Co.
TAP GRINDERS
Boggis & Co., Henry P.
TAP RECONDITIONING MACHINES
Detroit Tap & Tool Co.
TAPES—Measuring
Lufkin Rule Co.
TAPPERS—Hand
Bay State Tool & Machine Co.
Die Supply Co.
TAPPERS—Precision
Brand Tool & Supply Co.
Lassy Tool Co.
TAPPING HEADS
Procunier Safety Chuck Co.
TAPPING MACHINES
Detroit Tap & Tool Co.
Procunier Safety Chuck Co.
TAPS
Besly & Co., Charles H.
Detroit Tap & Tool Co.
Hy-Pro Tool Co.
Sossner Tap & Tool Co.
TELESCOPERS
Economy Engineering Co.
TEMPLATES
Gage Co. Division
THREADING TOOLS
Armstrong Bros. Tool Co.
U. S. Machine Tool Mfg. Corp.
TOOL BITS
Acme Tool Co.
Allegheny Ludlum Steel Corp.
Black Drill Co., Div. Black Industries
Boyar-Schultz Corp.
Carboloy Co., Inc.
Darwin & Milner, Inc.
Die Supply Co.
Super Tool Co.
Wesson Products Co.
TOOL SHANKS
Allegheny Ludlum Steel Corp.
Cooper-Bessemer Corp., The
TOOL STANDS
Scherr Co., Inc., George
TOOL STEEL (See STEEL—Tool & Die)
TOOLS
Acro Tool & Die Works
Alofs Mfg. Co.
Barth Stamping & Machine Works
Bunell Machine & Tool Co., The
Enterprise Machine Parts Corp., The
Kiffer Tool & Die Co.
McKinney Tool & Mfg. Co., The
National Machine Tool Co.
U. S. Machine Tool Mfg. Corp.
TOOLS—Carbide Tipped
Allegheny Ludlum Steel Corp.
Continental Tool Works, Div. of Ex-Cell-O Corp.
Firth-Sterling Steel Co.
Kennametal, Inc.
Super Tool Co.
TOOLS—Cutting (See CUTTING TOOLS)
TOOLS — Diamond (See DIAMOND TOOLS)
TOOLS—Flexible Shaft
Foredom Electric Co.
TOOLS—Machine
South Bend Lathe Works
TOOLS—Portable Electric
Acme Tool Co.
TOOLS—Precision
Fakes & Co., Joseph B.
Woodworth Co., N. A.
TOOLS—Recessing
Acme Tool Co.
TOOLS—Sintered Carbide
Allegheny Ludlum Steel Corp.
Firth-Sterling Steel Co.
TOOLS—Special (See SPECIAL TOOLS)
TOOLS—Special Cutting (See CUTTING TOOLS—Special)
TOOLS—Steel Marking
Cunningham Co., M. E.
TOOLS—Turning (See TURNING TOOLS)
TOOLS—Wheel & Thread Dressing
Wheel Trueing Tool Co.
TORCHES—Hand Gas
Johnson Gas Appliance Co.
TORCHES—Open Flame
Minn-Kota Foundry & Mfg. Co.
TORCHES—Soldering
Minn-Kota Foundry & Mfg. Co.
TRANSFER SCREW SET
Heimann Mfg. Co.
TRIG TABLES
Taylor & Associates, Herbert G.
TRUCKS—Hydraulic
Lyon-Raymond Corp.
TUBING—Tool Steel
Bissett Steel Co., The
TUBING—Welded Stainless
Carpenter Steel Co., The
TURNING TOOLS
Wheel Trueing Tool Co.
TYPE—Rubber
Gottscho, Inc., Adolph
TYPE—Steel
Gottscho, Inc., Adolph
New Method Steel Stamps, Inc.
TYPE HOLDER
Mercury Metal Die & Letter Co.
New Method Steel Stamps, Inc.

V-BLOCKS
Challenge Machinery Co., The
Lassy Tool Co.
Lufkin Rule Co.
Scherr Co., Inc., George
VALVES—Air
Mead Specialties Co.
VISE JAW CAPS
Yost Mfg. Co.
VISES
Armstrong Bros. Tool Co.
Bay State Tool & Machine Co.
Gorton Machine Co., George
Ideal Tool & Die Co., Inc.
Producto Machine Co., The
Wesson Products Co.
Yost Mfg. Co.
VISES—Air
Bellows Co., The
Mead Specialties Co.
VISES—Bench
Acme Tool Co.
Yost Mfg. Co.
VISES—Drill Press
National Machine Tool Co.
Thomas Hoist Co.
Yost Mfg. Co.
VISES—Machine
Cincinnati Milling Machine Co.
Gorton Machine Co., George
Producto Machine Co., The
VISES—Pipe
Yost Mfg. Co.
VISES—Milling Machine
Acme Tool Co.
Gorton Machine Co., George
Hartford Special Machinery Co., The
VISES—Precision
Vinco Corp.
VISES—Universal
Wesson Products Co.
VISES—Woodworkers' & Patternmakers'
Yost Mfg. Co.

WASHERS—Lock & Wrought
Die Supply Co.
WELDERS—Arc
Lee Co., K. O.
WELDING
Danly Machine Specialties, Inc.
WELDING ELECTRODES
Welding Equipment & Supply Co.
WELDING PLIERS
Knu-Vise, Inc.
WELDING POSITIONERS
Cullen-Friestedt Co.
Lyon-Raymond Corp.
WELDING RODS
Darwin & Milner, Inc.
WHEEL DRESSING TOOLS (See TOOLS—Wheel Dressing)
WHEELS—Abrasive
Besly & Co., Charles H.
WHEELS—Cutting Off
Carborundum Co.
WHEELS—Diamond (See DIAMOND WHEELS)
WHEELS—Mounted
Boyar-Schultz Corp.
Carborundum Co.
Chicago Wheel & Mfg. Co.
WHEELS—Sanding
Sand-O-Flex Corp.
WIRE FORMS & SHAPES
Gibson Co., The, William D., Div. of Associated Spring Corp.
WRENCH SETS
Armstrong Bros. Tool Co.
WRENCHES
Armstrong Bros. Tool Co.
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LABORATORY GRADED

PURE DIAMOND POWDERS

STAR DUST speeds up production enormously and produces finishes and superfinishes down to less than .0000004 of an inch.

Precision LAPPING POWDERS for PRECISION work

For GAUGES, TOOLS, DIES, etc., with tremendous TIME SAVING. These factors make STAR DUST indespensable in lapping and superfinishing on HARDSTEELS, TUNGSTEN CARBIDE, CHROME.

- **Absolute control of particle sizes**
- **Complete absence of out-size particles**
- **STAR DUST sizes as fine as .0001"**
- **Complete range of grit sizes**

There is a STAR DUST Field Serviceman in your territory.

ACE ABRASIVE LABORATORIES ONE SPRUCE STREET NEW YORK 7, N. Y.

WALTER STOCK ADJUSTING MACHINE—Complete details of the various operations that can be done on this machine are contained in Bulletin 540-A prepared by the WATSON-STILLMAN CO., Dept. TD, Roselle, N. J. This versatile unit is recommended for lengthening, straightening or shortening locomotive parts. Some thirty-six repair jobs on various parts of running and valve-motion gear of locomotives can be done quickly and accurately on this machine, thus saving valuable time and manpower and getting equipment back in service with a minimum of lost time.

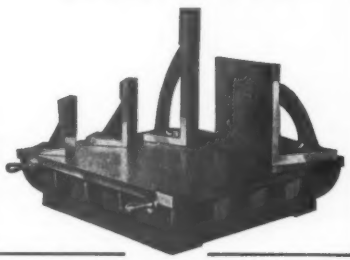
INFORM-A-GRAM KEY No. B44-A

FLOATING TOOL HOLDERS are featured in four descriptive folders available from the W. M. ZIEGLER TOOL CO., Dept. T, 1924 Twelfth St., Detroit 16, Mich. Their Combination Rigid and Floating Tool Holder is specifically designed for drilling and reaming or tapping a hole without stopping the machine, changing position of the work, or spindle. The Ziegler Roller-Drive Floating Tool Holder compensates for machine spindle mis-alignment. It is adaptable to all single and multiple spindle machines used for tapping and reaming. Shanks are furnished to fit all makes of machines and multiple spindle heads.

INFORM-A-GRAM KEY No. 535-A

MILWAUKEE

Surface Plates



A full line of surface plates, angles and box parallels. Standard plate sizes from 8″x 8″ to 48″x 96″, larger sizes with or without legs. Plates are finish-planed and scraped to insure a very accurate surface.

Write for details

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Engineers & Machinists Since 1907

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Special* DIES *Shaped

No need to worry about facilities for fast and reliable production of special-shaped dies—that's the specialty of the Hartley Wire Die Company.

Skilled workmen combined with extreme manufacturing care and most critical inspection assure you dies of the high quality you require, and the prompt service you desire.

"From blueprint to finished product"—that's Hartley service. Just send us the prints of the dies you require; no problem is too tough, no job too large or small. Every assistance we can give is yours.

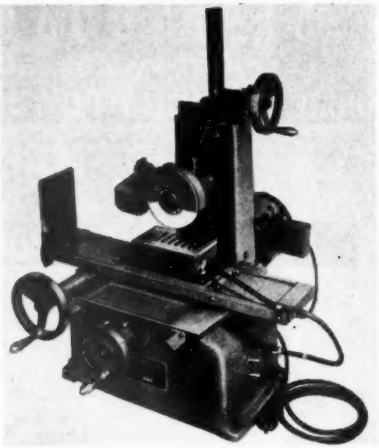
HARTLEY WIRE DIE CO

14 ELM STREET THOMASTON, CONN.

Bench Surface Grinder

The constant shrinkage of allowable tolerances in many manufacturing procedures, from thousandths to split-tenths in many instances, has presented a serious problem particularly in the grinding of small tools, dies, gages, and instrument parts. The sensitivity and ease of control necessary for such operations, "on parts that would fit in the palm for example", cannot be found in large machines.

To satisfy this need, the Sanford Manufacturing Company, Dept. TD, 1279 Springfield Ave., Irvington 11, N. J., developed the Sanford Bench Surface Grinder. This grinder is designed especially for the fussy little jobs which must be held to .0001". Rigid standards of accuracy and workmanship produces a grinder whose maximum errors, checked with a dial indicator, are transverse table movement and direction, and longitudinal table movement and direction, .0001"; vertical movement of spindle and spindle parallelism with table, .0002".



Standard equipment includes electrical equipment, magnetic chuck with tube rectifier, grinding wheel, flat belt, exhaust type wheel guard and spark shield.

INFORM-A-GRAM KEY No. 128-A

ELOX

ELECTRICAL DISINTEGRATION

3 TIMES FASTER

Radically changed—Cuts steel three times faster than before—"Disintegration" used to remove broken tools and cut odd shaped holes for piercing and plastic dies.

3 NEW MODELS

Priced to meet the needs of small shop owners.

ELOX CORPORATION

MACCABEES BLDG. DETROIT 2, MICH.

CHARLES R. BURGESS & ASSOCIATES—NATIONAL DISTRIBUTORS

"Ups and Downs" . . The Easy Way

PORTELVATOR (Portable Elevating Table)

For sliding work onto machines . . . for stacking . . . as work bench . . . for overhanging work . . . for carrying things to and fro . . . put PORTELVATOR to work. Easy to raise or lower by hand or power.

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THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

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ELECTRONIZED PRODUCTS

GAGE LUBE

WORLD'S MOST SUCCESSFUL WEAR-RESISTANT LUBRICANT FOR PRECISION SURFACES. MAKES FINE GAGES WEAR 3 to 10 TIMES LONGER.

Send for Trial Unit . . . **$5.00**

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Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

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For Power Driven and Hand and Foot Operated Machines.

Carried in New York stock in standard round, square, flat, and oval sizes. Special cutting tools designed or made to your blueprints or specifications.

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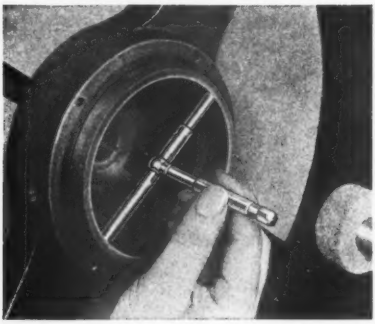
EXCLUSIVE! PLUNGERS QUICKLY CENTERED FOR PERFECT BALANCE



Lufkin Telescoping Gages are precision made to gage inside dimensions from 5/16" to 6". See them at your dealer's. Write for free catalog. THE LUFKIN RULE CO., SAGINAW, MICHIGAN, NEW YORK CITY.

LUFKIN FOR ACCURACY

GREENFIELD No. 4

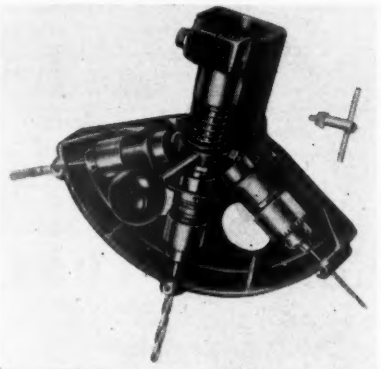
The sturdy Greenfield No. 4 Tool and Cutter Grinder with its new and heavier wheel head is capable of nearly every tool room grinding operation. Attachments make the Greenfield No. 4 into a universal grinder or provide for cylindrical or internal grinding. The graduated head swivels 90° to each side of center. Send for detailed application bulletin.

PRODUCTION MACHINE CO.

Dept. TJ ● Greenfield, Mass.

Drill Press Spindle Turret

The Universal Engineering Co., Dept. T, 2230 National Ave., San Diego 2, Calif., has put on the market a new and novel multiple tool holder for drill presses. The three position turret clamps on the quill of any standard drill press

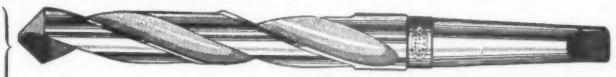


and gives the operator immediate choice of three different sized quills or other tools. This permits continuous operation without loss of time in moving work from one drill press to another, hence a saving in machines, jigs, and operator's fatigue. The turret is attached by simply removing the drill chuck and depth gage and slipping the bracket over the quill. It has been designed for maximum strength and engineered for rugged use, yet it is light in weight and built to give years of service. All parts are interchangeable. Its capacity is ¼" drill size and Jacobs ¼" capacity chucks are furnished as standard equipment. The turret is constructed to provide clearance for most types of jigs and fixtures and is easily shifted from one position to the other by a light movement of the indexing lever. Positive indexing locations are provided for long life, and maintenance of the tool is extremely simple. *INFORM-A-GRAM KEY No. D25-A*

★

Addition of a fourth star to the original Army-Navy "E" Award burgee, first hoisted over the Industrial Electronics and X-Ray Divisions of the Westinghouse Electric Corporation at Baltimore, Md., in September, 1942.

GORAL CARBIDE TIPPED DRILLS



You can drill, counterbore or countersink in hardened steel with Goral Carbide Tipped Drills as easily as in mild steel with ordinary drills. On automatic machines, run at normal drilling speeds, costly down time is greatly reduced. But extremely high speeds are possible when desired.

Recommended for drilling hardened steel, cast iron, aluminum, bronze, brass, copper, plastics; also Goral Carbide Tipped Mason Drills for cement.

Write today for illustrated Folder TD

GORAL TOOL CO.

5020 E. McNichols Rd. Detroit 12, Michigan
TWinbrook 2-1270

Future's Powerplants To Combine Super-charger, Engine, Turbine

Powerplant of tomorrow's heavy-duty motor vehicles may be a combined diesel engine, supercharger, and turbine, it was suggested before the recent Diesel-Fuels & Lubricants Meeting of the SAE, St. Louis Section.

The engine-supercharger-turbine combination was proposed as an effective method of putting exhaust gas to work. It was explained that application of the supercharger would increase the engine's power output approximately by 50%, and that the turbine would perform useful work in driving the supercharger. Future possibilities include utilization of the diesel engine merely to function as combustion chamber for the turbine and to drive the supercharger, with the turbine itself becoming the source of power.

A symposium on the economics of diesel engine operation brought to light several wartime problems looking for a postwar engineering solution, and established that merely replacing gasoline engines with diesels in commercial motor vehicles may be neither an easy nor direct route to operating efficiency and economy in peacetime.

The growing use of mobile diesels calls for storage and delivery facilities throughout the country, and the increasing volume is likely to rob diesel fuels of their prewar "free rides in the barges, tanks, pipe lines, and trucks of the heating oil or industrial fuel oil distributing systems." Furthermore it was stated that competition is growing in the middle-range hydrocarbons which are the source of diesel oils, and diesel users must expect to pay at least what diesel fuels are worth as cracking stocks.

Another warning came from Bryan Park, of Central Greyhound Lines, Inc., Cleveland, Ohio, who declared the diesel engine cannot rest on its present laurels of fuel economy, the advantage being lost unless related costs of maintenance can be held approximately at the level of competitive power sources. Mr. Park reported that the diesel, used as a power package in commercial motor vehicles, has been less satisfactory than in stationary applications because of obvious engineering problems not yet solved.

SIMPLEX • ***Automatic Single Purpose Drilling Units*** **(Patent Applied For)**

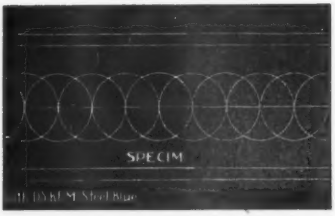
Made in progressive sizes with drill capacities from No. 80 to ¼" diameter

Long, trouble-free operation results from simplified construction which eliminates all unnecessary moving parts. Completely self contained Simplex Units may be mounted at any angle or plane and operated by electric circuits as desired. Forward and reverse movement of drill spindle is automatic upon closing motor circuit. Automatic drill feed, without cams, will not break drills as with positive feeds. Units are adaptable for drilling, reaming, spot facing, or step drilling to predetermined depth. Engineering service available to design fixtures or special machines for mounting and operating multiple units for high production.

Write for folder giving prices and full specifications

SIMPLEX TOOL ENGINEERING COMPANY

Dept. TD. 132 Duffield Avenue Detroit 1, Michigan



DYKEM STEEL BLUE
STOPS LOSSES
making dies & templates

Simply brush on, ready for the layout in a few minutes. The dark blue background makes the layout lines show up in a sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

THE DYKEM COMPANY
2201 N. 11th STREET ST. LOUIS, MO.

Tubular FEATHER TOUCH
SNAP GAGES

EASY to USE TU-MI-CO TUBULAR FRAME of special homogeneous grain structure steel is 25 to 50% lighter than solid frame—yet highly shock resistant. Lessens fatigue. Hermetically sealed, low thermal conductivity, less expansion. Triple plated—copper, nickel and chrome, buffed and polished—an attractive, high quality precision tool.

TUBULAR MICROMETER CO.
ST. JAMES, MINN., U.S.A.

Micronoil Metal Protection

Metal protection is found in Micronoil Moldeze, Micronoil Gage-Lube and Alkacite as compounded by Protective Coatings, Inc., Dept. TJ, P. O. 56, Strathmoor Station, Detroit 27, Mich. The Micronoil principle of lubrication and metal treatment of molds has attained high efficiency and economy.

Micronoil Moldeze is applied to molds by brushing, mist spraying or by use of a felt applicator. The carrier quickly evaporates, leaving the active elements in and on the metal thus overcoming the porosity of the metal. After a few applications between casts, the metal becomes conditioned and subsequent treatments are applied at extended intervals as the need indicates. Micronoil Moldeze can be applied to molds for plastics, rubber, lead and soft metal molding including die casting and to molds made of plastics, rubber and gelatine, also to plastic and rubber calendering rolls and extrusion dies for all materials. This treatment prevents adherence of any material to the molds, saves losses from rejects, stops damage to molds, speeds production and is a rust inhibitor.

Micronoil Gage-Lube treatment of gages increases gage life, promotes easier and faster gaging, and is non-gumming. It is successfully used on taps, reamers, broaches, punches and dies, and is rust inhibiting. Experience in one plant showed precision thread gages had a normal use-life of 8 hours; however, when treated with Micronoil Gage-Lube these gages gave in excess of 80 hours service. In another plant a precision gage had a normal use-life of 100 hours. After being treated with Gage-Lube the life was extended to 500 hours.

The Alkacite series of industrial coatings are used for their resistance to corrosive reagents.
INFORM-A-GRAM KEY No. 434-A

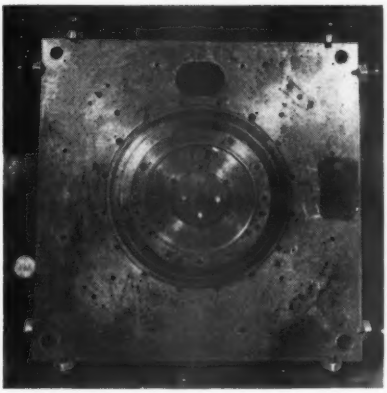
★

The establishment of The Glenn L. Martin Company corrosion research project at North Carolina Corrosion Farm places this organization among the top industries doing research in this field.

Tool Steel Tubing

Tool steel tubing as offered by Bissett Steel Co., 945 E. 67th Street, Cleveland 8, Ohio, eliminates the boring operation in the manufacture of tubular or ring-shaped parts made from tool steel and is now used for the quick, easy production of drill and liner bushings which are used in drill jigs and boring fixtures.

The illustration shows a large drill jig containing 52 holes used for guiding



drills. Each hole has a liner bushing which has been cut from a standard size bar of tool steel tubing. This material is used for bushings of this type both in cases where small standard bushings are not immediately available, or where bushings of large and unusual sizes are required. It is available in sizes from 1" to 15" OD, with a wide range of wall thicknesses.

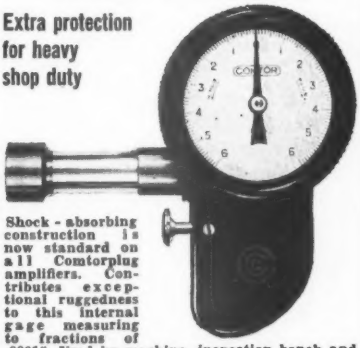
Tool steel tubing is made of an oil-hardening, non-shrinkable tool steel which is easy to heat treat and non-sensitive in the process. It attains hardness in excess of 60 Rockwell C. It can be used for cutting tools of many kinds, for dies, punches, collets, collet closers, spindle thrust collars, lead screw thrust collars, crushing rolls and other hardened rolls of all kinds, ring gages, slitters, spacers, skiving knives, machine tool parts and numerous other hardened parts. By eliminating the expensive process of boring large holes through solid bars of tool steel, it saves much time, money, labor and steel.

INFORM-A-GRAM KEY No. 603-A

Announcing the new

SHOCK-ABSORBING COMTORPLUG

Extra protection for heavy shop duty



Shock-absorbing construction is now standard on all Comtorplug amplifiers. Contributes exceptional ruggedness to this internal gage measuring to fractions of .0001". Used by machine, inspection bench and by final inspectors. EXISTING PLASTIC AMPLIFIERS CONVERTIBLE TO SHOCK-ABSORBING TYPE.

Request Bulletin 31

The COMTOR Co.

82 Rumford Avenue Waltham, Mass.

Grand Rapids No. 60 Universal Cutter & Tool Grinders feature cabinet base, ball bearing table and fixed table height, backed by 35 years of know how.

Bulletin on request

GALLMEYER & LIVINGSTON CO.

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GRAND RAPIDS (4) MICHIGAN

HELP PREVENT AN ACCIDENT TODAY!

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LETTERS & FIGURES

- No Spalling!
- No Mushrooming!

Pat. No. 2,089,794

- For tough stamping jobs.
- Deeper impression with less exertion.
- Any size character from 1/16" to 1".

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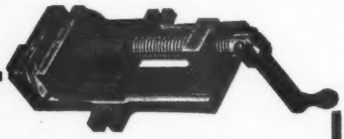
M.E. CUNNINGHAM CO.
SAFETY STEEL STAMPS
104 Carson St Pittsburgh 19, Pa.



YOST DRILL PRESS VISE

This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12⅛
2D	5	5½	23

Do you need a vise of ANY type?

Write today for bulletins on the extensive Yost line

YOST MFG. COMPANY
1000 MAIN ST.
MEADVILLE, PENNSYLVANIA

5-Tube Precisionaire

A new high amplification 5-Tube Precisionaire has been developed by The Sheffield Corporation, Dayton 1, O., and is an outstanding example of the almost unlimited possibilities of air gaging.

Five tubes, each capable of providing an amplification of 18,000 to 20,000 to 1, are combined in one instrument to check ten points along the one-half inch

diameter of a highly critical part. The tolerance at each point is ±.000005". Out-of-roundness, taper, and undersize or oversize conditions are disclosed.

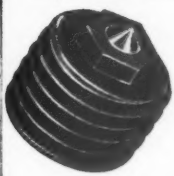
The part is checked as shown by placing it against the left side rail and rotating it thru 180°, this operation simultaneously checking five points along the diameter. It is then placed against the right side rail and again rotated thru 180°, which gives a simultaneous check of five different points along the diameter.

Maximum and minimum fixed size masters are used to set up the Precisionaire. With a master in gaging position, the orifices and air pressure are so regulated that all five floats are at the same horizontal line. Maximum and minimum tolerance limits are indicated by lines on the transparent adjustable sight.

INFORM-A-GRAM KEY No. 24-A

A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



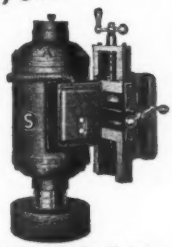
The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 3/16″ to 1″ diameters.

Send for price list.

HEIMANN MFG. CO.
Dept. T
Urbana, Ohio

"RIGHT! YOUR MACHINE TOOL CAN NOW SERVE YOU AS A (STANDARD) GRINDER TOO."

YES SIR! You can now make your machine a "double purpose" machine, the "Standard Way". STANDARD VERTICAL SPINDLE GRINDERS can be easily mounted on your Planers, Boring Mills, Shapers, Milling Machines, etc., giving you added profits! Available with or without feeds, as preferred.



Write for Your copy of Catalog 48, today

The STANDARD ELECTRICAL TOOL Co.
CINCINNATI · 4 · OHIO
Mt. Hope & Sixth St.

FIND OUT ABOUT THIS WONDERFUL NEW

REAMER

Reams to such close tolerances and satin-smooth finishes that honing is completely eliminated. Flutes spiral in opposed directions simultaneously —ideal for reaming over grooves or oil slots. Blades may be resharpened many times. .035″ to .080″ expansion range. Extensions for line jobs.

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EVANS REAMER AND MACHINE CO.
529 So. Main St. New Lexington, Ohio
Established 1919

HAMILTON SUPER-SENSITIVE DRILLING MACHINE

FLEXIBLE...*Easy to Operate*

Self-contained drilling unit swings radially on column and can be locked into any position. Full floating spindle eliminates radial belt pull.

Write for Bulletin

for super-sensitive drilling holes from .004″ to .250″ dia.

THE HAMILTON TOOL CO.
Ninth and Hanover Streets.
HAMILTON OHIO

Hybco Tap Grinder

The Hybco Tap Grinder is a complete universal tap sharpening and reconditioning machine for tap users. It is simple to operate and will sharpen and relieve the chamfer, grind spiral points such as gun, chip driver, etc., and sharpen the face of flutes.

Fig. 1 shows the floor model with base of welded steel, swing collet rack, large tray for holding work, and dust collecting system in the base. The air filter

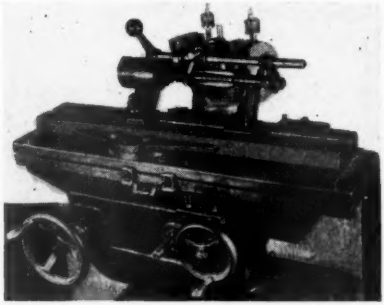
is a non-inflammable, easily cleaned, removable unit. The grinder unit is obtainable without the pedestal for bench mounting.

The Chamfer Sharpening Head is mounted on the left side of the grinder and will sharpen taps within the listed capacities with three different numbers of flutes. For example: ⅝" sharpening head capacity is No. 2 to ⅝" hand tap, 2-3-4 flutes R.H. and 2-3-4 flutes L.H.; 1" head capacity is No. 6 to 1", 2-3-4 flutes, 5-6-8 flutes R.H. and L.H. taps; and 1½" head takes taps ¾" to 1½" 4-5-6 flutes, 4-6-8 flutes, R.H. and L.H. taps. A separate collet is required for each size tap.

The Flute Grinding Head is mounted on the vertical, lever-operated slide on the right side of the grinder. Three sizes of heads are available, ⅝", 1" and 1½", taking the same flute combinations as the Chamfer Head. Taps are held by the shank with the same precision collets used in the Chamfer Sharpening Heads.

The head is mounted vertically to sharpen or recondition flutes and swung to an angle to grind spiral points. The slide is graduated in degrees to insure the proper angle and to facilitate duplicating the most effective grinding of spiral points.

With two well designed adapter bases the Chamfer Sharpening Head and Flute Sharpening Head can be utilized on universal tool and cutter grinders.



Bases are of cast iron and bolt to slide of grinder. They have a graduated scale for quick setting to degree of chamfer angle desired.

Because the taps are held by the shank, sharpening can be done after the centers are destroyed.

Fig. 2 illustrates Hybco Model 901 Grinding Fixture which can be used on cutter, cylindrical or surface grinders for accurately relieving chamfers on taps, reamers and similar tools. This fixture differs in its application in that the tool is held on centers while the other heads grip the tool by the shank.

Cam action leads tool forward while rotating, producing eccentric relief, and initial setting controls chamfer angle. Amount of relief is varied by changing pitch of cam with adjusting screw. Separate cams and screws provide for right and left hand operation, and being housed in the same unit, no changing of parts is required. This equipment manufactured by Henry P. Boggis & Company, Dept. TD, 1279 West Third Street, Cleveland 13, Ohio.

INFORM-A-GRAM KEY No. 802-A

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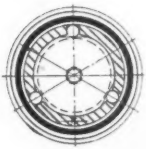

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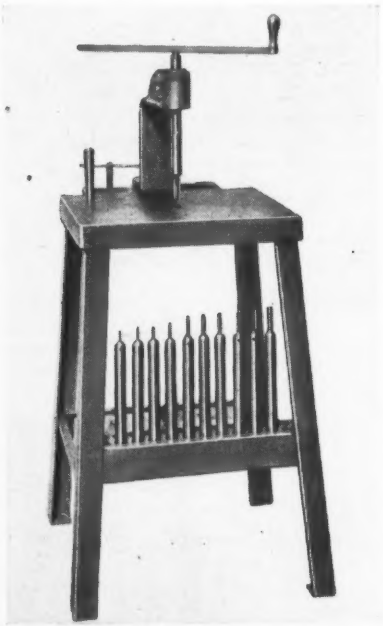
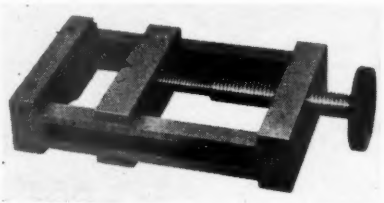
The Bay State Hand Tapper and Handy Vise make a convenient combination for speeding direct hand tapping operations. The Hand Tapper has a 16″ x 19″ table top, 32″ high, a clearance of 9″ from table to bracket and spindle center to bracket. The spindles are 1″ dia. x 11″ long with a square hole in one end to take the square shank of Standard hand taps. Standard spindles take regular taps from #5 to ¾″ and pipe taps ⅛″ to ½″. A rack on the machine holds spindles with taps inserted for every necessary job. The table top has several drilled holes to take a tapered stop pin. The hand tapper is simple in its operation, no setup being necessary. Work is placed on the table against the stop pin, spindle with desired tap inserted into tapper arm, crank placed on top of spindle with driving pin fitted in slot and crank turned until thread is finished. Labor time is reduced by 75%, at the same time producing accurately tapped holes at right angles without the aid of a square.



The Bay State Handy Vise is an accurate and general utility tool room vise with all surfaces ground parallel and square. Jaws are narrow stepped and ground so as to hold the work parallel, thus enabling the operator to tap and drill holes close to edge of work. The telescopic screws for setting jaws give quick action and reduce by one-half the projection of screw when jaws are fully opened. V section in jaw is used for holding round sections for grinding, drilling and tapping, while the open bottom of the vise gives projection clearance.



The vise is conveniently used to hold work while drilling and then transferred to the Hand Tapper for tapping the drilled holes, which materially reduces operation time.

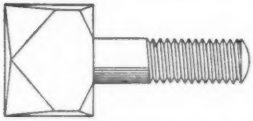
The 6″ Vise is 9″ long, 5½″ wide, 2″ high, with 6″ jaw opening.

The Hand Tapper and Handy Vise are products of the Bay State Tool and Machine Co., Dept. TJ, 412 Albany Street, Springfield, Mass.

INFORM-A-GRAM KEY No. E33-A

New Use for Horse Hair

Pegasus' aerial activity hardly would qualify the horse as a transportation member of the aviation world, but the equine family is doing its part in the design field. Now finding uses in sealing airplanes against entry of wind, water, sand, dust and oil is a brush consisting of horse-hair bristles mounted in a metal channel section. The new seal developed by The Glenn L. Martin Company armament and production design engineers in conjunction with several outside consultants, is considered more effective and durable than conventional types.



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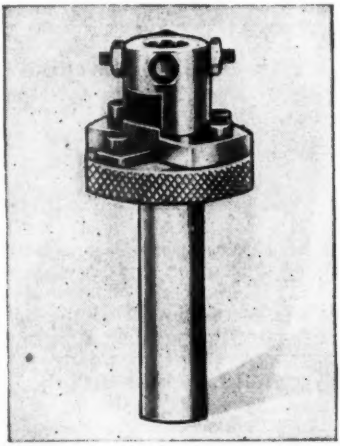

unique holder. The L & I Holder is set with an indicator for establishing an absolutely true center line which compensates for errors in chucks, turrets and even diagonal errors due to worn turret locks. Once the true center is established, reamers may be interchanged freely in any size within the holder's capacity, without the use of bushings or adapters. The reamer drives from a dead center on the true axis of the machine, which positively eliminates bell mouthing. Lack of weight on the reamer's shank end stops cramping or tapered holes. The new tool holder's uses are varied, including the reaming of super finish holes to very close limits; tapping class 3 fits; threading with self-opening dies; special form reaming; counterboring; and precision drilling. Stub Reamer and Chucking Reamer Heads of from $\frac{1}{16}$" to $\frac{7}{16}$" capacity and a Chucking Reamer Head of from $\frac{7}{16}$" to $1\frac{1}{16}$" capacity are now available.
INFORM-A-GRAM KEY No. 641-A

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R. J. Murray, secretary-treasurer of Jessop Steel Company, Washington, Pa., announces they have placed an order for a 19½" Sendzimir Reversing Cold Strip Mill under license agreement with the Armzen Company, Middletown, Ohio.

The new mill will have a capacity of 6,000 tons annually and will be used primarily for cold rolling solid and composite stainless and other alloy steels. The mill is a recent development in cold reduction and will increase the company's production, enabling them to help meet requirements for cold rolled specialties used in war equipment and industrial, commercial, architectural and domestic applications.

The new mill is being constructed by the Waterbury-Farrell Foundry and Machine Company at Waterbury, Conn.

ADVERTISERS INDEX

Aber Engineering Works .....June
Abrasive Machine Tool Co..... 61
Accurate Bushing Co..... 186
Ace Abrasive Laboratories..... 209
Ace Manufacturing Co..... 149
Acme Industrial Co.....185, 191
Acme Tool Co..... 58
Acro Tool & Die Works..... 192
Acromark Co., The..... 193
Advance Foundry Co..... 194
Ajax Manufacturing Corp.....June
Algoma Products .....June
Allegheny Ludlum Steel Corp.... 2
Alofs Manufacturing Co. 225
American Broach & Machine Co..June
American Industrial Publishers 139, 203
American Photocopy Equipment Co. .....June
American Products Co.....May
Ames Co., B. C..... 161
Angle Computer Co.....May
Anker-Holth Manufacturing Co... 54
Armstrong-Blum Manufacturing Co. 228
Armstrong Bros. Tool Co..... 226
Aro Equipment Corp..... 71
Automotive Maintenance Machinery Co. (Ammco)..... 38

Baker Brothers, Inc..... 141
Barnes Co., Inc., W. O..... 120
Bartelt Engineering Co.....June
Barth Stamping & Machine Works 195
Bay State Tool & Machine Co... 157
Behr-Manning Corp. 35
Bellows Co., The..... 33
Benchmaster Manufacturing Co... 40
Besly Co., Charles H.....June
Bissett Steel Co., The..... 180
Black Drill Co., The..... 29
Boggis & Co., Henry P.....June
Bokum Tool Co.....June
Boyar-Schultz Corp. 177
Brand Tool & Supply Co.....May
Builders Iron Foundry.....June
Bunell Machine & Tool Co.....86, 87
Burke Machine Tool Co..... 168
Busch Co., J. C..... 209

Cadillac Gage Co. 50
Cadillac Glass Co..... 173
Carboloy Co., Inc. .....June
Carborundum Co. 53
Cargille, B. P..... 207
Carpenter Steel Co., The.....June
Catalin Corp. .....June
Cerro de Pasco Copper Corp.....June
Chambersburg Engineering Co...April
Challenge Machinery Corp..... 149
Chicago Drillet Corp..... 150
Chicago Rawhide Manufacturing Co. 189
Chicago Screw Co..... 55
Chicago Wheel & Mfg. Co..... 93
Cincinnati Grinders, Inc..... 13
Cincinnati Milling Machine Co... 12
Cincinnati Shaper Co..... 77
Cincinnati Tool Co., The.....June
Clark Instrument Co..... 79
Clark Co., Robert H.....28, 160
Cleveland Twist Drill Co., The.. 96
Cleveland Universal Jig Co..... 223
Clinton Machine Co..... 83
Colonial Broach Co.....June
Colonial Bushings, Inc..... 205
Columbia Tool Steel Co..... 91
Comtor Co., The..... 215
Conner Tool & Cutter Co.....June
Conrad & Moser..... 223
Continental Machines, Inc.....June
Continental Tool Works, Div. of Ex-Cell-O Corp. 127
Cooley Electric Manufacturing Corp. 59
Cooper-Bessemer Corp., The.....June
Criterion Machine Works..... 153
Crucible Steel Co. of America..April
Cullen-Friestedt Co. 169
Cunningham Co., M. E..... 216

Danly Machine Specialties, Inc.. 27
Darwin & Milner, Inc.....June
Davis Tool & Engineering Co... 223
Dearborn Gage Co..... 10
Deepfreeze Division of Motor Products Corp. 78
Delta Manufacturing Co.....May
Denison Engineering Co., The... 51
Denning Manufacturing Co., The. 223
DeSanno & Son, Inc., A. P.....June
Detroit Die Set Corp..... 43
Detroit Reamer & Tool Co..... 88
Detroit Stamping Co..... 174
Detroit Tap & Tool Co..... 137
Detroit Universal Duplicator Co..June
DeVlieg Machine Co. 62
Diamond Tool Co., Not Inc..... 226
Dickerman Manufacturing Co., H. E. 30
Die Supply Co..... 181
Don Gage Co.....April
Douglas Machinery Co., Inc..... 72
Dreis & Krump Manufacturing Co. 223
Dresel-Betz Co. 223
Dumore Co., The..... 67
Dykem Co., The..... 214

Eastern Etching & Manufacturing Co. 225
Eastern Tool Supply Co..... 156
Economy Engineering Co..... 11
Elgin National Watch Co.....June
Elox Corp. 210
Enterprise Machine Parts Corp... 66
Erickson Steel Co.....April
Evans Reamer & Machine Co.... 217

Fakes & Co., Joseph B..... 181
Federal Products Corp.....June
Federal Tool Corp..... 145
Firth-Sterling Steel Co.....22, 23
Fish-Schurman Corp. .....June
Florian Manufacturing Co.....June
Ford Manufacturing Co., Inc., M. A. 14
Ford Motor Co., Johansson Div... 165
Foredom Electric Co.....June
Forging & Casting Div. of Allegheny Ludlum Steel Corp.....June

Gage Co. 85
Gairing Tool Co.....June
Gallmeyer & Livingston Co..... 215
General Aircraft Equipment, Inc..June
General Die & Stamping Co..... 81
General Die & Tool Co..... 223
General Engineering & Mfg. Co.. 21
Genesee Manufacturing Co., Inc..June
Gibson Co., Wm. D..... 140
Goral Tool Co..... 213
Gorton Machine Co., George..... 135
Gottscho, Inc., Adolph.....June
Great Lakes Metal Specialty & Mfg. Co. .....June
Greene, Tweed & Co..... 184
Grinders and Fixtures, Inc..... 179
Grobet File Co. of America..... 187

Hamilton Tool Co.....211, 217
Hammond Machinery Builders... 151
Hardinge Brothers, Inc..... 3
Hartford Chrome Corp.....May
Hartford Special Machinery Co... 226
Hartley Wire Die Co..... 209
Haskins Co., R. G..... 7
Heimann Manufacturing Co..... 217
Heller Brothers Company..... 6
Herman Stove Co., The.....June
Hoggson & Pettis Manufacturing Co. 155
Holo-Krome Screw Corp., The... 5
Hovis Screwlock Corp..... 84
Howell Clamp Co.....June
Hy-Pro Tool Co..... 188

Ideal Tool and Die Co., Inc..... 173
Illinois Tool Works..... 151
Industrial Machine Co., The..... 223
Industrial Products Suppliers.... 221
Interstate Designing & Tool Co.. 221

J & S Tool Co.....175, 189, 223
Jacobs Manufacturing Co.....March
Johnson Gas Appliance Co..... 178

Kalamazoo Tank & Silo Co..... 171
Kearney & Trecker Corp..... 133
Kempsmith Machine Co..... 34
Kiffer Tool & Die Co..... 223
Knu-Vise, Inc. 69
Koebel Diamond Tool Co.....June
Kondor Products Corp.....March

Lassy Tool Co.....June
Latrobe Electric Steel Co..... 70
Lavallee & Ide, Inc..... 63
Lee Co., K. O..... 129
Lempco Products, Inc..... 167
Lester-Phoenix, Inc. .....May
Lewthwaite Machine Co., T. H.. 211
Linderme Machine & Tool Co.... 176
Linley Brothers Co..... 157
Logan Engineering Co.....June
Lombard Governor Corp.....Feb.
Lucas & Son, Inc., J. L..... 221
Lufkin Rule Co., The..... 212
Lyon-Raymond Corp. 172

M-B Products .....June
Madco Products, Inc..... 148
Madison-Kipp Corp. .....June
Master Electric Co., The.....Mar.
Master Gauge Co. 179
Master Manufacturing Co..... 48
Masterform Tool Co..... 171
Mattison Machine Works.....April
McKinney Tool and Mfg. Co....18, 19
Mead Specialties Co.....175, 183
Mercury Metal Die & Letter Co.. 131
Merz Engineering Co.....June
Metal Cutting Tools & Mfg. Co.. 183
Meyers Co., W. F.....June
Michigan Tool Co.....May
Middlesex Gauge & Tool Corp... 169
Milwaukee Chaplet & Mfg. Co.. 182
Minn-Kota Foundry & Mfg. Co.. 226
Mohawk Tool Co.....May
Moore Special Tool Co., Inc..... 68
Muehlhausen Spring Corp..... 56

National Foreman's Institute.... 89
National Machine Tool Co.....April
National Twist Drill & Tool Co.. 9
Needham, E. H.....June
New Method Steel Stamps, Inc..April
Newton Manufacturing Co..... 199
Niagara Blower Co..... 190
Nichols-Morris Corp. 158
Nichols & Sons, W. H.. 47
Nicholson File Co..... 73

Noble & Stanton, Inc. 223
Nobur Manufacturing Co. 8
Norton Co. 32
Numberall Stamp & Tool Co. 207

Oliver Instrument Co. 146
O'Neil-Irwin Manufacturing Co. . 49

Paramount Tool Co. 223
Peerless Machine Co. ..... May
Perfection Tool & Metal Heat Treating Co. 191
Perfex Gage and Tool Co. 65
Phillips & Co., C. E. ..... June
Phoenix Machine Co. 223
Pipe Machinery Co. 31
Portage Machine Co. 177
Precise Products Co. 159
Preis Engraving Machine Co., H. P. ..... June
Procunier Safety Chuck Co. 155
Production Machine Co. 212
Production Machinery Development Co. ..... May
Producto Machine Co. 154
Protective Coatings, Inc. 211
Putnam Tool Co. 1

Rane Tool Co., Inc. 223
Reid Brothers Co. 142
Republic Drill & Tool Co. ..... June
Republic Gage Co. ..... June
Rivett Lathe & Grinder, Inc. ..... June
Robbins Engineering Co. 20
Roberts Rubber Co., Weldon 201
Rockford Die & Tool Works, Inc. 223
Rockford Machine Tool Co. 52
Rusnok Tool Works 193

Sand-O-Flex Corp. ..... June
Sanford Manufacturing Co. 162
Scherr Co., George 82
Schraner & Co., A. P. 225
Scully-Jones & Co. 60
Sheldon Machine Co., Inc. 46
Shore Instrument & Mfg. Co. 222
Slowek Tool Division, Domestic Industries, Inc. ..... June
Simplex Tool Engineering Co. 213
Smit & Sons, Inc., J. K. ..... June
Sommer & Adams Co. 227
Sossner Tap & Tool Corp. ..... June
South Bend Lathe Works 76
Special Devices Co. ..... June
Springfield Machine Tool Co. 94
Stackbin Corp. 185
Standard Electrical Tool Co. 217
Standard Pressed Steel Co. 161
Star Machine & Tool Co. 197
Strong, Carlisle & Hammond Co. . June
Stuart Industries, Inc. ..... June
Sturdimatic Tool Co. 92
Sun Tool & Gauge Corp. ..... April
Sunnen Products Co. 147
Super Sales & Engineering Co. . June
Super Tool Co. ..... June
Swedish Gage Co. of America 187

Tannewitz Works, The 36
Tanzi Engineering Co., Aurelio .. 221
Taylor & Associates, Herb 221
Taylor Machine Co. 221
Thermo Electric Manufacturing Co. ..... June
Thomas Hoist Co. 170
Thomas Machine Manufacturing Co. ..... June
Thompson & Son Co., Henry G. . June
Timken Roller Bearing Co. 25
Tomkins-Johnson Co. 80
Tools & Gages, Inc. 45
Triangle Engineering Co. 153
Trico Products Corp. 152
Tubular Micrometer Co. 214
Turchan Follower Machine Co. .. 42
Turner Gauge Grinding Co. 26

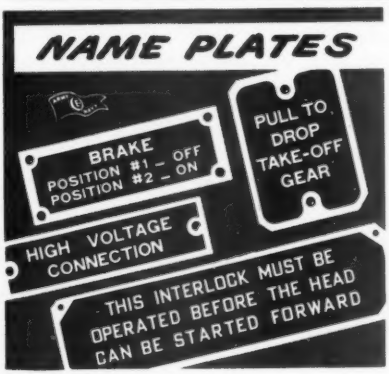
Ulmer Co., The. J. C. 223
U. S. Machine Tool Manufacturing Corp. 222
Universal Engineering Co. 74, 75
Universal Engraving & Colorplate Co. 41
Universal Tool Co. ..... June

Vard, Inc. 17
Variety Machine & Stamping Co., The 223
Viking Tool & Machine Corp. 223
Vimco Manufacturing Co. ..... May
Vinco Corp. 16

Wales-Strippit Corp. 57
Wall-Colmonoy Corp. ..... June
Walls Sales Corp. 219
Webber Gage Co. 90
Welding Equipment & Supply Co. 37
Wells Manufacturing Co. 24
Wesson Products Co. 143
West, R. C. 221
Western Aircraft Tool Co. 159
Wheel Trueing Tool Co. ..... June
Wheelock, Lovejoy & Co. 211
Whistler & Sons, S. B. 44
Wilson, K. R. 59
Wittek Manufacturing Co. 64
Woodworth Co., N. A. 15
Wyzenbeek & Staff, Inc. ..... May

Yost Manufacturing Co. 216
Young Arbor Co. 219

Zagar Tool, Inc. ..... March
Zeiss, Inc., Carl 205
Zimmerman Parking Co. ..... May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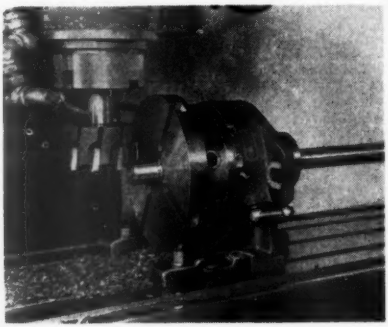

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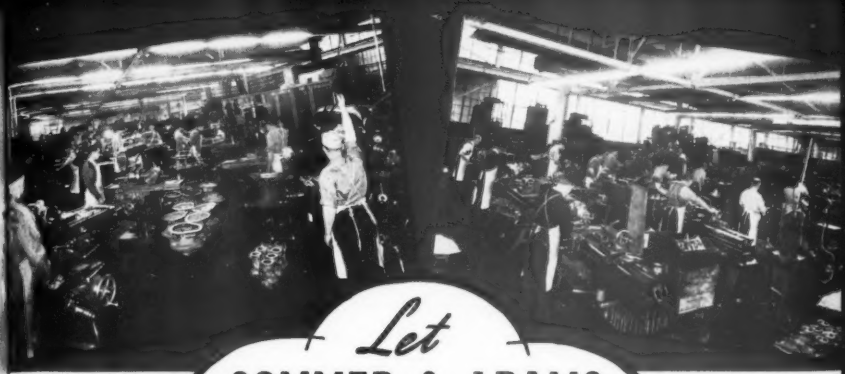

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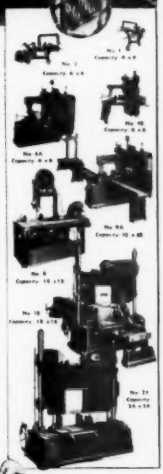

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